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Original Contributions.

REMOVAL OF IMPACTED THIRD MOLARS—STEREOSCOPIC SKIAGRAPHY.

BY C. EDMUND KELLS, JR., D. D. S., NEW ORLEANS. READ BEFORE THE NATIONAL DENTAL ASSOCIATION, AT ASHEVILLE, N. C., JULY 28-31, 1903.

The definition of the word impacted being given as "pressed closely," by impacted third molars I mean those that are "pressed closely" between the ramus of the jaw and the second molar, as will be depicted upon the screen later.

The removal of impacted third molars is doubtless one of the most difficult and least desirable operations we are called upon to perform, and the teachings of some of the leading dental surgeons of the day relative thereto are so greatly at variance with my own methods that I am led to place them before you.

Dr. J. D. Thomas, a specialist in extracting, recommends unequivocally (page 637, American Text-Book of Dentistry) the removal of the second molar in the following language: "In addition to the difficulty in removing these teeth, this severe process of pressing the inner alveolar plate toward the tongue excites a state of inflammation easily communicated to the soft tissues of the throat, and the after effects assume in many cases such serious conditions that it is better practice to remove the second molar. * * * If the third molar is sound it may remain and cause no further trouble, as the primary difficulty was caused by crowding and pressing upon the second molar; and should it be necessary, from decay, to remove it, the extraction of the second molar first renders the operation simple and easy of accomplishment."

In regard to this it should be noted that by the extraction of the

second molar the tooth above it is rendered valueless, and will in all probability in time be lost by exfoliation, and the patient is thus unnecessarily deprived of a comparatively large masticating area. In a practice extending over a period of nearly twenty-five years I have never found it necessary to thus sacrifice the second molar.

Dr. M. H. Cryer, in his instructions for the removal of these teeth, as given in the American Text-Book of Dentistry, referring to the case shown in Fig. 1, states—"If trouble existed in this region the explorations would have to be made with sharp steel probes. The bone would then have to be cut away until the tooth could be grasped with the forceps." This was written in 1900. In April, 1903, *International Dental Journal,* page 289, in discussing this subject Dr. Cryer once more reiterates his opinion of the value

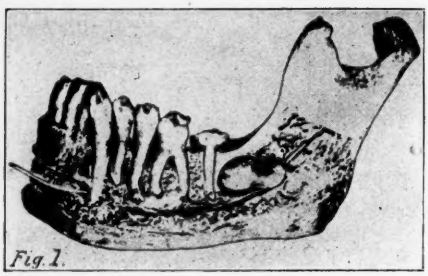


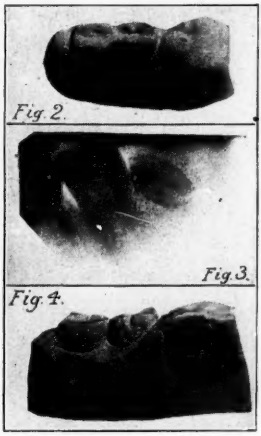
Fig. 1.

of steel probes in such cases in the following words: "I have been unfortunate so far in having some of our best X-Ray men take skiagraphs for me. To-day if I had a case of impacted tooth I would depend upon a good sharp excavator rather than upon the X-Ray."

This is certainly a most remarkable statement coming from such an authority. If the author were unknown it should be dismissed without comment, as it discloses a remarkable lack of knowledge upon the value of the Roentgen Ray, and it is astonishing that such a distinguished teacher could hold such views at the present day. Referring to Fig. 1, which illustration (taken by permission from the American Text-Book of Dentistry) shows the right half of the lower maxilla, the outer plate having been removed to allow the impacted third molar to be seen, I would call your attention particularly to the dense character of the structure above the tooth

in question, and it is through such dense bone as this that we are instructed to "probe with sharp steel points, and thereby get the location and character of the tooth."

Who is there in this audience that upon the supposition, mind you, supposition only, that there was such an impacted tooth located deeply in that jaw could have satisfactorily "located" it by "sharp steel points" and removed it in a creditable manner? I have no hesitation in acknowledging that such would have been entirely beyond my ability. However, it is fortunate that there is no longer any necessity for such doubtful methods, for since the discovery of the Roentgen Ray six years or more ago there has been no



occasion to be in doubt about the presence of an impacted third molar, as a skiagraph positively diagnoses the case.

In contrast to this illustration and method I now display a case, Fig. 2, from my own practice. Here was an instance of the lower third molar having been "extracted" eighteen months previously in a dental parlor, since which operation the patient had never been entirely free from pain. Suspecting that the root might not have been removed, although as the model shows no sign of same was visible, a skiagraph was taken with the result as shown in Fig. 3. With this positive guide as to size, shape and location of the offending root, it is hardly necessary to say that it was quite easily re-

moved, and the value of the skiagraphic diagnosis is beautifully verified by a comparison of the root and its skiagraph. Fig. 4.

From the volume already mentioned I again quote from Dr. Cryer—"An impacted third molar causes great distress by initiating an inflammation which extends to the region surrounding the angle of the jaw and often including the temporo-maxillary articulation and soft parts within the mouth. Under these conditions the jaws can be only partly opened, deglutition is impaired, and solid food


Fig. 5.

cannot be taken. One of two things must be done—either the offending tooth or the one in front of it must be extracted."

This statement I am not prepared to deny, though as before stated, while during my practice I have seen numerous impacted molars, I have not met with such a case as described, although strange to say I have seen just such results from ordinary third molars, which were extracted without injury to the second molar and almost immediate relief was given.

It would therefore seem that such conditions must be rare. In fact, I will go a step further and say they should be rare. I am

FIG. 6.

sure an impacted third molar could not usually produce the conditions described by Dr. Cryer, in a young patient. They must be caused by pressure due to time. Now the point I wish to make is this—an impacted third molar should be diagnosed by skiagraphy in its early eruptive stage, and once correctly diagnosed as such should be removed without delay. The early removal of such teeth has always been my practice, and doubtless it is due to this precaution that I have not yet seen the serious conditions described by Dr. Cryer, and which would result in the loss of the second molar.

The models to be exhibited of teeth extracted are all of com-

paratively young people and most of them young girls. During the week just passed two young girls presented, each about to erupt a third molar which in both cases appeared impacted. Skiagraphs revealed the one to be in the correct position and the other locked under the second molar. Is it not much wiser to remove the impacted tooth without delay, rather than to await the development of trouble which would materially increase the difficulty?

In Figs. 5 is shown an ideal case of the class under consideration. Examine the mouth and, as the model shows, the tiniest point of the tooth is seen projecting through the gum, and from this visible portion not the slightest indications are given as to the size, shape


Fig. 7.


Fig. 8.

or position it holds in the jaw. The skiagraph speaks for itself. This gives a general idea of the size of the tooth and shape of the roots, and shows it firmly locked between the dense ramus and the second molar, with its mesial cusp well under the convexity of the distal surface of the anterior tooth, thus rendering it impossible to raise it without either fracturing the tooth in question or the second molar. With such an illustration before us the question is not, how can anyone question the value of the Roentgen Ray in these operations, but rather, how dare the surgeon operate without its use? This patient was a girl about twenty years of age. Was it not my duty to remove the tooth at once, rather than to await troublesome developments?

It does appear to me that I must have had more than my share of these troublesome cases, the result of which was the development of the following mode of operating—1st. The obtaining of a skiagraph of the region in question, thus displaying the location, shape and surroundings of the impacted tooth. 2nd. The tooth being found securely locked under the second molar, as already shown, the entire mesial cusp is cut away, partly by the aid of diamond cup-shaped disks, which will cut to a limited depth only, and completely by suitable fissure burs in the right angle handpiece. Sufficient of its cusps *must* be removed to entirely free the tooth from the second molar. This is most important.

No burs found upon the market are considered suitable for this work, as they are in many instances too short to reach to the required

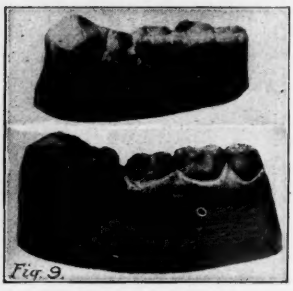


Fig. 9.

Fig. 10

depth. Again, the cusps of the third molars are usually very dense and hard and the burs as made are very weak. A special instrument, shown in Fig. 6, is made for me for this purpose, which is much more satisfactory.

(ADDENDA.—Since reading this paper, I find that the method as described of using the fissure burs in the right angle handpiece has been misconstrued. It did not occur to me to say that I did not use it with the bit held in a *vertical position,* for such would be impossible, although some of my hearers assumed such was my method. As just stated, by holding the instrument in that manner it would be impossible to reach the portion of the tooth desired, but if the bit is held *horizontally,* cutting at one time with the handpiece to the lingual side of the molar, and again from the buccal side, and using a saw-like motion, it will be found that most excellent results are obtained.)

3rd. The alveolar process situated immediately over the tooth is cut away by suitable round engine burs to as great an extent as the individual case warrants. 4th. The tooth is now in such condition that it can be raised without injury to itself, the molar in front of it, or the bone surrounding it, and an elevator suitable to the case in hand is used for this purpose, working it slowly under the tooth and using gentle but firm pressure. In this manner the tooth is gradually raised well out of its berth, when it may be grasped with forceps and the operation completed.

At times when the crown has been much decayed it has been necessary to drill under the tooth to make an opening for the elevator, but such is not always the case. Absence of decay of course facilitates removal. Cutting off the cusps is not usually painful,

Fig. 11.

but the drilling of the process is, and during this work I use a local anesthetic. Likewise under the influence of this the teeth were formerly removed, but since the advent of the Hurd apparatus nitrous oxid has been used in this stage to very great advantage. Words fail to express my appreciation of this innovation in the administration of nitrous oxid, though I must add that I do not find it necessary to use the chloroform attachment.

The operation as described is not severe, and usually there are practically no bad after effects other than some soreness. No inflammation or sloughing is to be expected under ordinary circumstances. The patient is instructed to use a warm antiseptic wash from time to time during the day as long as the soreness exists, which may be for forty-eight hours or so. In one instance only have I had to treat the socket after the removal in this manner

of a very refractory tooth, and in that case there were constitutional complications.

Too much importance cannot be placed upon the starting of the tooth from its socket by the elevator, as in its abnormal position no forceps are adapted to grasp the tooth without danger of breaking it, more especially if the crown is weakened by decay.

Prior to the introduction of skiagraphy in my practice the removal of impacted third molars was always undertaken with dread, and if I must be candid, though I regret the necessity for such an admission, the very difficult ones were usually removed in sections and upon the installment plan, the crown at one time and the root or roots (*perhaps* a year or two) later. However, since the X-Ray has been available the operation has been transferred from the

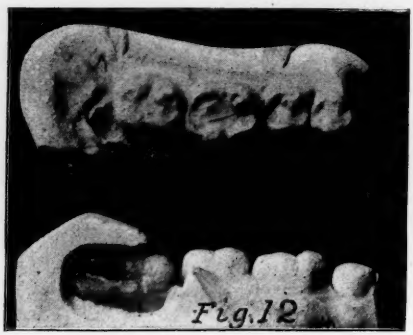


Fig. 12

realm of guesswork into that of absolute knowledge, and it is with pleasure that I show the models containing the offending teeth which were removed whole in the manner just described.

While I hesitated at first to criticise the methods taught by such eminent surgeons, as quoted, I am now more than ever convinced that the routine of procedure here presented is based upon correct and modern principles, taking advantage of one of the most wonderful discoveries in the world's history, and at your president's invitation I have brought the matter before you. Unfortunately it was only recently that it occurred to me to preserve the records of this work in the models as exhibited, this being the reason of their limited number. Even during this time some of the teeth have been unfortunately lost, and a number of the skiagraphs have faded

out through defective photographic manipulation due to inexperience, while others have been lost by sending them away. In each case, however, the fresh skiagraph gave the outlines of the teeth sufficiently clear to render the work successful.

The exhibits are arranged to show—1st. The model of the case as it presented. 2nd. The skiagraph of the case. 3rd. The extracted tooth placed in its original position in a duplicate model. Several of these will now be shown upon the screen. Figs. 7, 8, 9, 10, 11, 12. I would say, however, that lantern illustrations of work of this character cannot do full justice to the models and films, and those interested are invited to examine the originals which I have with me for that purpose.

Referring to Fig. 11, the following is the history of the case. The patient, a young man about 28 years of age, presented com-

plaining of some soreness in the region depicted, and I advised the removal of the third molar, explaining how I purposed to do so. Thereupon he made an appointment for the operation, when he returned and the work was performed. I then learned that after leaving me upon his previous visit he was persuaded by a friend to consult the latter's dentist, a man well known to the profession. He advised cutting off the crown of the second molar, the extraction of the third, which would then be comparatively easy, and finally the recrowning of the second. Is it to be wondered at that the young man chose to return to his own dentist, who did not propose to put him through such an ordeal?

In Figs. 13 is shown a case of a young girl, in which there was every indication of an impacted tooth, but the skiagraph disclosed the tooth to be normal, though well in the ramus of the jaw.

STEREOSCOPIC SKIAGRAPHY.

Regarding the art of skiagraphy, upon the value of which so much stress has been laid, I would say that in July, 1896, it was

my privilege to demonstrate the value of the Roentgen ray in dentistry before the Southern Dental Association upon this very spot, and to-day it is my pleasure to lay before this Association what is probably the greatest step in the advance of this art, namely, stereoscopic skiagraphs.

As is well known, a skiagraph is strictly a shadow picture, and as such its value in many instances is limited. A subject with a bullet in his body may be skiagraphed and the shadow of the bullet will be plainly seen, but that indicates its presence only and not its location. I will throw upon the screen a shadow picture of a hand, which is holding a knife clasped within it, but from the pic-

Fig. 14.

ture, Fig. 14, no one not conversant with their relative positions when the picture was taken could assert whether the knife was placed above the hand, within the hand, or under it.

So it is with all plain skiagraphs—they can mean but little except to those who are in a position to properly interpret them. Being strictly shadow pictures they differ radically from photographs, in which all that is visible to the eye may be reproduced upon the sensitive plates, and consequently can be readily understood by any one. However, by the dental or general surgeon, who either makes the skiagraph himself or understands perfectly under just what conditions it was produced, the skiagraph can be properly interpreted and is most valuable.

It is frequently necessary to localize a foreign object within the body, and for this purpose several methods have been devised, among which is that of the stereoscopic system, and it is to this that I wish to call your attention. I believe credit is due to Dr. G. P. Girdwood of Montreal for displaying the first stereoscopic skiagraph, which he did in the Spring of 1898 at the Toronto meeting of the Society of Railway Surgeons.

Assuming that the principle of stereoscopic photography is perfectly familiar to all, it is only necessary to say that in taking skiagraphs of this character we proceed as in photography, and that is by taking two pictures of the same object from positions exactly 2½ inches apart, care being taken that the focus in both pictures

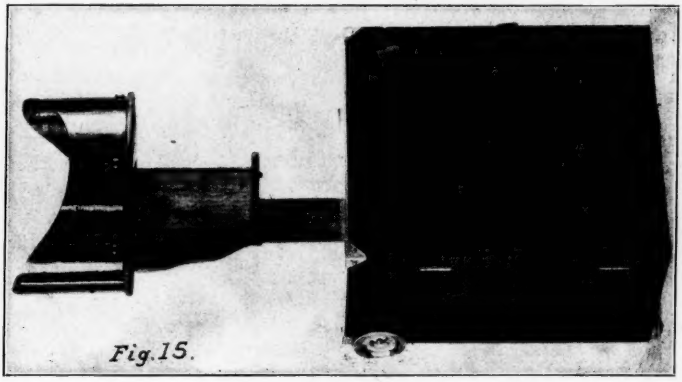


Fig. 15.

is upon the same point. Then when the resultant pictures are properly mounted and viewed in the stereoscope there is no longer seen a flat picture, but one is practically looking *at* and *through* the object skiagraphed.

Referring again to the hand and knife, let us first take a picture with the tube placed 12 inches above and 1¼ inches to the right of the center of the back of the hand, and then without moving the hand, change the plate and move the tube 2½ inches to the left (that is, 1¼ inches to the left of the center) and take another picture. The plates are then to be developed in the usual manner, and prints made therefrom, which being viewed upon the ordinary Wheatstone reflecting stereoscope will produce the most beautiful and wonderful results. Instead of a flat shadow picture we now

see through the flesh as though looking through a cloud; the bones stand out in bold relief in their relative positions, and the knife can be plainly seen to be held in the palm of the hand, clasped therein by the thumb. The wonderful beauties of such a picture cannot be described, they must be seen to be appreciated.

What is most remarkable is this—the pictures being taken as seen by the right and left eyes respectively, if viewed accordingly, that is, the picture seen by the left eye in front of the left eye, and the picture seen by the right eye in front of the right eye, the object

FIG. 16.

appears to be viewed from the direction in which it was skiagraphed. But if these pictures are reversed, that is, if the right eye picture be placed before the left eye, and the left eye picture be placed before the right eye, then, most wonderful to relate, the resultant single stereoscopic picture shows the object as if viewed from the opposite side from which the skiagraphs were taken. In other words, by simply exchanging the pictures of the hand in question we may view it from the palmar or dorsal surface as we may choose. However, in viewing stereoscopic skiagraphs we must remember that we are looking through objects of different degrees

of transparency to the X-ray and it requires some little concentration of attention to obtain fully the beautiful results that are possible. Unfortunately, stereoscopic skiagraphs cannot be shown upon a screen, but must be viewed through the stereoscope, one observer at a time.

Stereoscopic pictures of the teeth are most beautiful. The crowns and roots stand out in bold relief, their contour plainly visible, while the alveolar process presents a transparent but hazy ap-

Fig. 17.

pearance through which the roots are readily seen. Fillings are plainly located upon their proper surfaces, while unerupted teeth may be located upon the lingual or buccal side of the adjoining roots, as they may happen to be.

An ordinary skiagraph is a most wonderful thing, but it is a flat picture, and a glance at it is almost sufficient. Not so with a stereoscopic view. This is not only much more wonderful but infinitely more beautiful. No passing glance at such is satisfactory,

but on the contrary one can gaze upon and study its details, and the longer one looks the more are its latent beauties made manifest.

Almost immediately after entering upon this work I realized that the Wheatstone or the ordinary popular stereoscope could not bring out the full beauty of these skiagraphs, and as a result devised one which I trust will be considered a great improvement upon either in many ways. Skiagraphs frequently lose many of their beautiful details when printed ever so carefully, and the stereoscope in question allows the originals up to about 3x3¼ inches in size to be viewed direct, while all larger ones are reduced to come within this size, and the glass reductions (in which the details are preserved) themselves are viewed.

In this apparatus, as shown in Fig. 15, the ordinary stereoscopic holder is replaced by a box containing electric lamps and several ground glass slides which allow more or less light to be thrown through the skiagraphs. In this manner nearly all surrounding light is cut off from view, and thus the details of the picture are brought out to the best advantage by transmitted light.

While stereoscopic pictures of other parts of the body are comparatively easy to make, good dental specimens are difficult to obtain for very obvious reasons. We have first to take one picture, then remove the film from the mouth and replace it by another, and then move the tube and make the second exposure, during which series of operations the slightest movement on the part of the patient will mar the result. However, it is evident that the difficulties are more apparent than real, as I have a number of pictures to show, including some of the lower jaw, in which case the difficulties are much greater than in the upper, which must be self-evident.

I will call your attention to one picture in particular, which though not strictly dental, must be nevertheless interesting. It is of a head with a bullet in it, and the pictures were taken from a living subject.

A very interesting exhibit is that of a bicuspid root carrying a porcelain crown, in which two pins of unequal length may be clearly seen, and which of the two is the labial or lingual may be positively ascertained.

As before stated, this work cannot be shown to an audience like

this, but must be viewed individually, and I will therefore hold myself ready at any time to show the views to those interested.

Under the usual methods the work of developing and fixing photographic films and plates is objectionable to dentists, as the chemicals used affect the hands, it being almost if not quite impossible to prevent their contact. Again, the manipulation of the very small films, such as are used in taking dental skiagraphs, is more or less difficult on account of their size, and in the beginning many were spoiled accidentally from that cause.

To overcome these difficulties a system of manipulation was devised by which the exposed film is taken from its protecting envelope and placed in a holder, and from then on the successive steps of developing, rinsing, fixing, washing and drying are carried on consecutively without any of the chemicals coming in contact with the hands, and the film itself is not endangered by being handled.

A film for use within the mouth is cut to a standard size of 1¼ by 1½ inches. After exposure it is taken from its protecting envelope and placed in a glass tube about 3 inches long by 1⅛ inches in diameter, as shown in Fig. 16. You will note that the diameter of the tube being somewhat less than the width of the film, the latter must be slightly bent to enter the tube, and its elasticity holds it in position therein. From now on through the successive stages of development and completion of the picture the glass tube acts as a holder, the hands need not come in contact with the chemicals, and the transparency of the tube allows of the film being examined from time to time as may be necessary. Fig. 17 shows tube and film placed in jar of developer. One or more of these are placed in an opaque (light-proof) jar upon the rocking machine.

While the development of an ordinary photograph requires but a few minutes of time, a skiagraph may take from five minutes to an hour or more according to certain conditions obtaining. A rocking machine was therefore constructed, which being driven by an electric motor keeps the developing fluid gently agitated for whatever time may be necessary, thus greatly relieving the operator and at the same time producing more satisfactory results.

By the use of the method as described, while I practically do all my own developing, a dental skiagraph does not require five minutes of my own time, all the other stages of work being carried out

by my assistant, while I am confident that at no step is she liable to make a mistake and spoil the picture.

While it is possible to carry out all the processes of the making of a dental or other skiagraph in broad daylight, which I have done by the use of opaque jars and a suitably arranged light-proof receptacle, it is my opinion that a dark room will allow the production of better results.

Discussion. *Dr. T. P. Hinman,* Atlanta, Ga.: The X-ray is an acceptable aid in locating delayed or unerupted cuspids, and is very useful in localizing an abscess area. I have visited Dr. Kells on several occasions and can speak only in the highest terms of his methods and work. It would pay anyone to go to New Orleans to see the stereoscopic work, if nothing else.

Dr. L. E. Custer, Dayton, O.: The use of the stereoscope was not mentioned first by Dr. Girdwood, although he was the first in the United States to bring it out, and I believe he used it without knowing what Dr. McKenzie Davidson of London had done. The work of the two men was almost simultaneous.

By the old methods it is almost impossible for the operator to tell the exact position of impacted teeth, and it has been correctly pointed out by Dr. Kells that the explorer does not reveal same. In any event it cannot tell as accurately as the X-ray. This is only one of the many important uses of the X-ray, but you must be convinced from this demonstration that if it had no other advantage it should be used as an aid in diagnosis. Many a good sound second molar has been extracted because we did not know the exact position of the third. Dr. Kells probably has no more of these cases than the average practitioner, but by the aid of the X-ray he is able to tell exactly what is required, while those working without it must depend upon guesswork. There is no doubt that the X-ray has reached the point where it should be largely used in dental practice. It is not expected that every dentist shall develop into an X-ray expert, and in the large cities the X-ray laboratories are a fixed department in the hospitals. Where that is not found, however, a private laboratory is not only practicable but one of the most valuable adjuncts of which a dentist in a small town can avail himself—not only for his own use, but it will be appreciated by the physicians in the neighborhood, and a physician would rather go to a dentist for his X-ray work than

to another physician. Although I live in a city of 100,000 inhabitants, my work for physicians amounts to more than for my own use.

Dr. J. P. Corley, Greensboro, Ala.: Some years ago I reported to the Southern Branch of this Association a case in which a patient suffered from septicemia from an obscure cause. The two prominent symptoms were edema of the left side of the face and constant and severe pain. The patient while unconscious and with a temperature of 105° was examined by a physician, a surgeon, an aurist and a dentist, none of whom found the cause of the trouble. The surgeon finally made an incision through the buccal membranes from the outside of the face and an evacuation of pus followed. This left a fistula which had been discharging for five months when the case came under my observation. The patient was fifty-six years of age and had lost all of the lower posterior teeth fifteen years before. I opened the gum at the point where the third molar would ordinarily erupt, and found that that tooth was back in the angle of the jaw with its longitudinal axis pointing towards the mastoid process on the opposite side. Only one cusp had emerged from the alveolar process, and the tooth was entirely covered by the gum. After temporizing for a week, and gradually dissecting away the fibrous tissue and the fistulous tract, and then cutting off with a bur the alveolar process from one side, I finally succeeded in turning the tooth out. There was nothing abnormal about it except an excementosis on one root, but the discharge stopped and the fistula healed. If the X-ray had been available for this case the trouble could have been diagnosed at once and the patient would have been saved months of suffering and permanent disfigurement.

WHAT TO DO WITH PORCELAIN.

BY W. T. REEVES, D.D.S., CHICAGO. READ BEFORE THE PENNSYLVANIA STATE DENTAL SOCIETY, AT WILKESBARRE, JULY 7-9, 1903.

What to do with porcelain—make use of it to fill teeth in all parts of the mouth. First of all be honest; be honest with yourself, and be honest with your patient.

Clinical facts have demonstrated beyond all controversy that porcelain is par excellence as a filling material; it has won its place against stubborn conservatism, and every vantage ground it has gained has been by hard fought effort on the part of its advocates. The members of the profession have been like the man from Mis-

souri, they had to be shown, but having been shown, they should be honest and give porcelain its just dues.

The fact of the matter is, the opposition has been so persistent and long drawn out because the opposers could not do the work. They are about at their last ditch in framing excuses to their patients why they do not put in porcelain fillings. It will not answer always to cry wolf, wolf. Patients are fast finding out that it is lack of ability and not lack of material that is behind the cry of wolf, and they will go to someone who does use porcelain and can put in porcelain fillings.

Two of the latest excuses or arguments against porcelain came to my attention this past month, namely, that they are always coming out, and that you have to cut away so much good sound tooth structure in order to be able to put in inlays. To discuss the first, that they are always coming out. Who of you would consider that a valid reason for not putting on a crown where a crown was indicated? There is an occasional crown that loosens and has to be set over again, you all meet with that in your practice, but who of you would for a moment consider that any ground against crowning or bridging? There is an occasional inlay that loosens and has to be set again. We cannot tell why this crown or inlay should loosen and have to be set again when so many others never loosen. We mix the cement in all cases as nearly the same as we can make one mix like another, and yet one loosens and the others do not. In the case of the inlay it is just as likely to be one that is not subject to occlusal stress as one that is. There is always more or less theorizing to the patient to account for the loosening. To-day a patient presenting himself with an inlay to be set does not bother me any more than you are bothered by a patient coming with a crown that has loosened.

To discuss the second argument, that you have to cut away so much good sound tooth structure in order to be able to put in inlays. That is almost "the limit," but it is very effective, for if there is one thing more than another that patients dislike, it is to lose any remnant of tooth that they may have left, and they will often postpone work or change plans rather than have some tooth cut that good may result. When the case is put to them, that to have the porcelain that they want they will have to sacrifice more of the tooth than would have to be cut for a gold filling, they will decide against

the inlay rather than have the tooth cut. But woe be unto that dentist when the patients find out the truth in the matter, for his advice then will be a regular boomerang.

Those persons who have heard enough about inlays to ask their dentists for them will sooner or later learn more about them, and then they will know that the dentists' argument was a subterfuge behind which to hide their inability, and that more tooth structure was cut to prepare for the gold filling than would have had to be cut if the cavity had been properly prepared for an inlay. You may judge what the outcome will be. Several such individuals have become patients of mine, and I don't think they are working very hard for the other dentists. No, gentlemen, be honest. If you cannot successfully perform a given operation with porcelain, tell your patients so, tell them that you have done very little in that line of work and don't feel able to undertake that particular case. If you know of anyone who is doing porcelain work, tell them that Dr. A— is doing more along that line than you are, and that he might be able to do it for them. Your patients will respect your honesty, and if they go to Dr. A— for that particular inlay they will still remain patients of yours for other work, but if you deceive them and they find it out you will lose them, and their influence against you will be more than their loss.

If you are a beginner in the work, and don't feel that you have had experience enough to undertake some difficult case, I think I can help you out so that you can retain your patient and successfully accomplish the operation. Take an impression of the tooth or teeth; from your box of extracted teeth select the corresponding tooth, and your impression being your guide, shape a cavity just as the cavity you want to fill will be, or if you can carry the shape of the cavity in your eye, dispense with the impression. Start the separation for working space, and by the time this is accomplished and you make an appointment for the work, you will have found time to make several matrices and inlays for the dummy tooth, and in this way gain experience for this particular cavity that will enable you to successfully perform the operation for your patient.

Be honest in your criticism or judgment of work that comes under your observation. Do not try to advance yourself by pulling someone else down. You do not know under what conditions the work was put in—under the same conditions you might not have done as

well. Do not decide against taking up any line of work because of failures that you may have seen. To decide that this or that is no good, because someone had failed in that particular line, would be very poor judgment to follow; look to those who are successful, and aim to equal or surpass their success. Because some have jumped into porcelain work without any preparation other than a furnace and an outfit of bodies, and have met with consequent failures, is no argument against porcelain. You did not any of you learn in a day, or a week, or a year, to put in the gold fillings that you can do to-day, and why should you expect anything different with porcelain? The technique throughout is radically different from any other work we do, and everyone should expect to do a certain amount of preparatory work before he attempts an operation at the chair or expects to accomplish results. Above all things make a start in porcelain fillings.

To-day you can procure everything in the way of materials and appliances that you could ask for, so different to what it was even five years ago. Manufacturers have vied with each other in the compounding of bodies until now we have several on the market that are about perfect. Demand has brought this about. This same demand has stimulated the inventive genius of men in all sections of the country, and the result is that we have a number of good electric furnaces, also good gasoline and gas furnaces, that make the baking of porcelain easily and quickly accomplished. The item of time is an important factor in all the affairs of to-day. The furnaces of the present have cut down the time consumed in baking porcelain so that we can accomplish at one sitting for a patient what was formerly divided between two sittings. This saving of time has brought porcelain work to the point where anyone who is doing fifty per cent of his filling with porcelain, as between gold and porcelain, will find that he is accomplishing the porcelain fillings in less time than it takes him to put in gold fillings.

Time is an important factor in deciding on any line of work, but there is another equally important factor, that is, physical strain and endurance. Here porcelain is a godsend to both operator and patient, for with it you can fill teeth with less tax upon your strength or your patient's than any other work done at the chair.

There are three things in favor of taking up this work—less time,

easier work, and last but not least, more pay. Any one of these, if there were nothing more, should be inducement enough.

You will think that so far there has been very little said on "What to do with porcelain," but first I must tell you what you can do with porcelain. You can restore to full contour and usefulness broken-down teeth that would otherwise be condemned to crowning. Many a tooth which is so far gone that there is not tooth substance enough left in which retention can be cut to anchor a gold or amalgam filling, and which would have to be crowned, can be restored with porcelain. Instead of further weakening by trying to get anchorage you will strengthen, for all the cutting necessary is to remove all decay, the undercuts if any can be filled up with cement, and a porcelain filling, adapted to all parts of the cavity as closely as at the margins, and cemented to place under pressure, makes that tooth practically as strong as it was originally.

You can take those teeth that remain sensitive to thermal changes after being filled with a gold or amalgam filling, not enough to endanger the pulp, but just enough to be a constant annoyance to the patients, who speak to you about it every time they see you, and if you will remove the metal fillings and replace with porcelain their troubles will be over, and they will be remarking how comfortable those teeth are now—that they would not know they had them. Porcelain is the best non-conductor of thermal changes and the best insulator against electric or galvanic action of any material we have ever used, and it restores a tooth to a practically normal condition.

You can take those teeth where decay has been so extensive as to almost make an exposure in its removal, where with all the protection you can give by cavity lining you are afraid the pulp will die under a cement filling, to say nothing of gold or amalgam, and if you will make a porcelain filling, carrying the material to the full depth of the cavity, so that there will be but a film of cement between filling and dentin, you can assure your patient that there is little likelihood of those teeth ever giving any trouble.

You can take a mouth that is a disfigurement through the number of gold fillings that are in sight, and by replacing them with porcelain you can so alter the appearance that at conversational range no one would suspect there were any fillings in the teeth, and they will become a feature of beauty instead of unsightliness.

You can permanently fill teeth with porcelain for the young, the

middle-aged, and the old, the nervous, the sickly, and all those with whom heretofore the best you could do was to temporize, because the cavity preparation is so simple and easily accomplished that any of the above named will allow you to do all that is necessary to properly prepare the cavity. After that it is like making the dentist a visit, for part of the time they can read the papers or magazines, or go out and do a little shopping, or go home and come another day for the completion of the work.

You can do more with porcelain under more varied conditions than with any other material we have ever used. It would make too long a paper to enumerate further or even to touch upon some of the many physical qualities that porcelain possesses. I trust you are all familiar with most of these. If you are not it is your own fault, for enough has been written that if you had read as you ran you would be well posted. Perhaps it went in one ear and out the other, because you thought it was too much like a fairy tale, and too good to be true, but the half has not been told. In porcelain we have one of the greatest blessings that has ever come to the profession and the laity.

What to do with porcelain. First of all have plenty of working space. You cannot put in flat porcelain fillings; you must have room for the inlay to start into the cavity. In the majority of cases you will need no more than is necessary to put in a properly contoured gold filling. Do not try to get this space at the time of the sitting with a separator, because the latter will handicap you in the completion of the operation. Get working space before the time of the appointment. Having space, you will contour properly and will restore contact points superior to anything you have ever accomplished with cement, amalgam, or gold. Your patients will appreciate the changed condition brought to their mouths by having this working space, and they or you will not consider it time wasted.

Through this necessity is going to come a great benefit to the laity and also to the operator. The operator seeing the superior results he is obtaining will separate for all materials he may be using. This will bring him to working up to an ideal standard, and when one is working towards that he is working at his best, and success is sure to crown one's best efforts.

Always prepare the cavity so that the orifice is larger than interior. If undercuts come because of the removal of decay, and the enamel

walls have any dentin supporting them, fill them with cement and shape the cavity as though there had been no undercuts. Bevel all margins to a knife edge with the outer plane or surface of the tooth, having a seating form for setting purposes. This can be accomplished in the majority of cases by a slight flattening of the floor in a triangular form. A No. 2 round bur run around the interior will change a saucer-shaped cavity to a flattened floor, and prevent the inlay from slipping and getting out of place when the cement is in the cavity. It is very discouraging after setting an inlay to find on cleaning away the excess cement that one margin is depressed and the opposite correspondingly raised. A seating form for setting purposes will prevent this. Use gem and Arkansas stones in preparing a cavity wherever it is possible to do so. They will remove decay and shape a cavity with much less pain to the patient than burs.

Always burnish your matrix directly upon the tooth. Taking an impression and making a model, to say the least, is working once removed from the original, and no one would expect to accomplish as good results upon a model three or four times removed as he would upon the original, and there is the same percentage of difference between working upon the tooth and upon a model. Besides, it takes so much more time as to make it impracticable for the busy man, it being out of the question to prepare a cavity, make and set an inlay at one sitting.

Always use platinum 1-1000 of an inch in thickness for your matrix. The best results, everything considered, will be accomplished with this material and that gauge. Gold would prevent the use of high-fusing bodies, and up to the present time the best all-round results and artistic effects can be accomplished with high-fusing bodies.

Do all your porcelain work with two or more bodies that fuse at different degrees of heat, making a foundation of two-thirds of the work in hand of the highest fusing, finishing with the colors you want to use that are lower fusing. This prevents the repeated bakings disturbing the first or foundation. Disintegration or minute bubbling is almost sure to follow a second or third firing. Using bodies of a different degree of fusing will prevent this and give you the maximum strength with the minimum risk.

Always work without the rubber dam. The dam is a source of

discomfort to the majority of patients, and if on will dry out the tooth so that you will not be able to select colors that match inlay to tooth. Always look for underlying shades in the tooth in deciding what colors to use in your inlay; taking a facing that you think is a good match for the tooth and then working to that will not give you good results, because you are working to something once removed from the original. Besides, whoever saw a facing that was an exact match for a tooth? In a tooth there are always some underlying colors that are not in the facing. In baking an inlay you can put these colors in their respective places and thus get match of inlay to tooth. Take the shade guide furnished with every outfit of bodies, and holding it to the tooth determine what colors you see and their strength. It is only by comparison that a correct decision can be arrived at. What may seem to you to be a blue effect may not be blue at all, and it is only by holding blue to the tooth that you discover this, and that when gray is held to the tooth the law of compensation is satisfied and that it is gray you want in the inlay.

Always bake your inlay in layers. This will accomplish three things—translucency and life-like appearance, avoidance of shadow, and reducing to the minimum the cement showing through from underneath. Bake into the matrix a foundation that practically makes an inlay for the lingual half of the cavity. Upon this foundation bake the colors you have decided on in their respective places. Never mix two or more bodies together to vary the shade of one. You can get any shade of a given color by the thickness of the layer you bake. The shade guide furnished with every outfit gives the color that body will be if you bake the same bulk to a full glaze. Bake in your colors strong enough that when subdued by a mutual color there will be an enamel layer which will give you the color wanted. This gives you translucency, and the porcelain being in strata will break up light absorption and refraction and thus do away with the shadow problem. The same procedure with the etched surface next to the tooth will reduce to the minimum the chance of cement showing through.

Always try in the inlay before stripping off the platinum, and see that the contour and contact point are just right, so that if any grinding is necessary it can be done and the inlay then be returned to the furnace and glazed again. Never grind any surface of an inlay after setting, other than the occlusal surfaces of molars and

bicuspids and the cutting edge of the anterior teeth. The glazed surface of porcelain will not retain food deposits or glutinous plaques, and consequently is a protection to surrounding and approximating tooth surfaces.

Always dip matrix and inlay in water if you are bothered in stripping off the platinum, and you will find it will come off easily. This shows that a joint so tight as porcelain baked upon platinum is pervious to water. I will let you draw your own inferences.

Always etch the reverse side of the inlay with hydrofluoric acid. This will leave a roughened surface that cement will adhere to very tightly and still not remove surface enough to take away from close adaptation. Imbed the inlay in wax to protect the exposed surface, and then a drop or two of hydrofluoric acid left for three to five minutes will etch sufficiently.

Put on the rubber dam wherever it is possible to do so, to set an inlay, as that insures dryness and a reasonable degree of crystalization before moisture bathes the tooth. Always secure pressure, either by wedge or ligature, and leave under dam and pressure for thirty minutes. Pressure will give a better quality of cement, and will prevent the expansion of crystallization from making a perceptible joint of what was a good-fitting inlay.

Always wait until the dam is off and moisture has bathed the tooth before removing excess cement. It will then loosen easily and there will be no danger of dislodging the inlay. Always leave the slight line of cement at the joint to wear away, which will be in a few days. Mix the cement as near the color of the tooth as possible, so that the cement at joint will not be conspicuous.

Always show the inlay to the patient set and wet by the saliva. At no time will it ever look better, and first impressions are often lasting. Say that the drying out of the tooth under the rubber dam makes it several shades lighter, that it will be several hours before the tooth is back to color again, and that the inlay will look better a week hence than it does the first day. Tell the patient that he will always be able to see the inlay, that it is like the puzzle pictures in the papers—when you have once solved the picture you can always see it. Others at close conversational range will not see the inlay nor imagine there is a filling in the tooth.

Discussion. *Dr. S. E. Gilbert,* Philadelphia: After ten years' experience with porcelain I can heartily endorse what has been said by

the essayist. This material has come to stay and a man will succeed if he works carefully and conservatively. Failures are most apt to come from lack of judgment and from the enthusiast trying to place inlays anywhere and everywhere, forgetting that there are places where it is not wise to attempt it. Never leave a poor filling in the mouth. If the work does not satisfy you, tell the patient so and do it over. This is better than to let the patient be told of the poor work by someone else. To do porcelain work properly demands more skill than gold fillings, and the operator must also have the artistic instinct. It is difficult to get the proper shades, and they can be arrived at only by experience. The solubility of the cement is not to be considered. I have never had any trouble with the cement dissolving out if the joints were right.

Dr. F. D. Gardiner, Philadelphia: I would differ slightly with Dr. Reeves as regards the preparation of cavities, as I think the cavity should always have a flat floor, have an angle in the dentin. In shaping cavities I have found that a round finishing bur is better than any form of stone. They do not wear away, have accurate form, leave a fine polish when sharp, and give the same results when used to prepare a margin. There is no doubt in my mind about porcelain inlays being more desirable than gold if they are fitted with care and accuracy and match the tooth in shade. They make ideal fillings for the anterior portion of the mouth at least.

TOLERANCE OF THE TISSUES TO FOREIGN BODIES, WITH SPECIAL REFERENCE TO THE PULP AND GUMS.

BY M. H. FLETCHER, M.D., D.D.S., CINCINNATI. READ BEFORE THE SECTION ON STOMATOLOGY, AMERICAN MEDICAL ASSOCIATION, MAY, 1903.

The reason that one foreign substance within the tissues is less or more irritating than another is to be determined not alone by the character of the substance, but also by how it influences the cells of the tissues involved. That environment influences cell life is well known. Aside from their food, they may be influenced by temperature, electrically, by chemicals, and mechanically. Our present purpose is to consider mechanical irritants.

In treatises on "gunshot wounds" it is presumed that the bullet

is of lead, and the practice almost universally advised is to leave the ball undisturbed if it is not easily found. There is an adage generally adhered to, to the effect that "when a bullet has ceased to move it has ceased to do harm." The accompanying specimens of elephant's tusks, one with a lead bullet encapsulated, the other with an iron bullet rolling about in what seems to have been a pus cavity, show the different effects these two metals may have on living tissue (assuming the condition to have been the same). These bullets, which were shot at the animal's head, penetrated the pulp-chamber of the tusk, the animal living long enough afterwards for them to become encapsulated in ivory, or produce a pathological cavity.

The protrusion of a broken steel broach from the apex of the root of a pulpless tooth seems invariably to cause an abscess, whereas the protrusion of a gutta-percha point apparently causes no trouble.

A number of years ago Gunn suggested the use of beeswax for packing wounds in place of other dressings, and it was found to be a good procedure, the wax being unirritating to granular surfaces. Four years ago Gersuny of Vienna demonstrated the practicability of injecting even large quantities of paraffin and vaselin into the tissues for therapeutic as well as for prosthetic purposes.

The writer has been using softened gutta-percha as a therapeutic measure in bone cavities for a number of years. My attention was first drawn to this feature seventeen years ago by having inadvertently injected too much chloro-percha through a pulpless tooth into a blind abscess. A tumor of this material the size of a pea could be felt at the apex of the tooth, and since it caused no inflammation and produced no trouble it was allowed to remain undisturbed, and it is there to-day, never having caused the least disturbance. I believe it is the practice of many dental surgeons to inject chloro-percha through pulpless teeth until it appears at the fistulous opening, expecting the tissues to heal quicker by this treatment than by any other.

Caseous pus may become encapsulated and remain apparently harmless until finally absorbed.

Trichina in small numbers no doubt could remain indefinitely in the tissues without their presence being known, for they are most beautifully taken care of.

Steel needles may wander through the flesh without pain and

without apparent damage. Dr. P. S. Conner is authority for the statement that a knife-blade may be tolerated in the same manner, and that iron balls, fragments of shells, splinters, and, in fact, almost any foreign material, if not accompanied by septic matter, may become encapsulated, but agrees that softer, more yielding substances, which are impervious to moisture, are less irritating.

We will assume, then, that as foreign bodies certain substances are of themselves noxious or innoxious in degrees proportionate to their physical properties. Those that are most innoxious are impervious to moisture and more or less yielding in character. Hard, smooth substances like a needle or knife-blade may be tolerated, but if they become oxidized or roughened by chemical action they then seem to produce trouble. Hard, rough substances of any kind seem more irritating than a soft pliable material, providing the latter be impervious to moisture. Pieces of cloth or bits of wood seem especially noxious, for reasons which may be explained.

Foreign bodies may be classified as extrinsic or intrinsic, according to whether they are forced into the body from without, or whether they were part of the body, or produced within.

The present object is to consider the manner in which the animal economy deals with sequestra, calcareous deposits about the teeth, and an irritated pulp.

The Pulp.—In teeth of persistent growth the pulp practically remains one size and is more or less cone-shaped, with its apex directed to the grinding surface and into the long axis of the tooth; the base of the pulp is at the source of supply as shown in the elephant's tusk. When an injury occurs to such a pulp it has every chance of recovery that other tissues have, because of collateral circulation. If the irritant be a foreign body (as shown in the elephant's tusk) it is finally pushed beyond the zone of the pulp, and the formation of dentin proceeds regularly as before. This is true of all tusks and the incisors of all rodents.

In mature teeth of limited growth, as found in man, these conditions are reversed, the apex of the pulp is directed to the apex of the root, and the blood and nerve-supply is limited to the minimum amount necessary to the life of the pulp, so that in case of injury there is no collateral circulation or nerve-supply for purposes of rapid repair, such as may be found in other tissues; hence the great

number of pulpless teeth in human beings, where lesions of the pulp far outnumber those of any other animal.

In filling teeth a pulp may be successfully capped with any suitable innoxious substance, providing the capping does not press upon it. The walls in which this organ is confined being unyielding, any pressure beyond normal produces inflammation, which cannot be taken care of as it could in other tissues. This is from lack of ability to expand, as is necessary in inflammation, and the consequent interference with the circulation, hence the death of the pulp in a comparatively short time. An exposure of the human pulp or other injury to it is most prone to its ultimate death, no matter how successfully the capping may have been done, and it would seem that this proneness to die is due to the very limited supply of vessels. Aside from the difference in mechanical surroundings, there seems no reason why this organ should not recover from injury as easily as any other composed of like tissues, for the process of repair here is no different from that of repair in other tissues of mesoblastic origin. The fact seems to be that the process of repair is practically identical in all tissues, the great essential being abundant blood-supply.

Decay, fillings, cappings, or abrasions may be looked upon as foreign bodies, for they stimulate the pulp to action, resulting in an effort on the part of this organ to protect itself or repair damage done.

The peripheral ends of the fibrils may be considered as a part of the pulp, and wearing away or destruction of any part of these delicate processes is a lesion of tissue as truly as an amputation or other larger injuries. Irritation to the pulp, however, which is short of acute inflammation and death, usually results in the production of more dentin; this may take the form of nodules, or a protective growth at the pulp ends of the fibril irritated. These growths are shown in the accompanying tooth sections. This effort at protection, however, often results in death from lack of space in which to work, accompanied with the lack of collateral supplies. Compare these results with that of injury to the tusk. Repair in the latter case is not hindered by unyielding confinement as it is in the former, and restoration is complete. Pulp-nodules in many instances act as foreign bodies and end with a destructive result to the soft tissue involved. Adherent new growths in the pulp-chamber also have

similar endings in many cases, the attempt at repair itself defeating its own object.

Charles B. Nancrede says, "Repair is effected by the same processes in the hard and soft, the vascular and the avascular tissues, the differences being temporary, non-essential, and chiefly dependent upon physical conditions. Thus the lime-salts render the bone so dense that until they are removed only a limited accumulation of leucocytes and, later, proliferated tissue-cells can take place at the site of injury; yet from the outset the soft parts of the bone undergo the same changes in kind as does the least compact connective tissue.

"Two forms of repair are usually described, but in reality there is but one, the second variety being at the outset only a modification of the first, caused by disturbing influences. When these cease to be operative the processes of repair tend to proceed as at their inception, any variations from the typical methods being accidental, not essential parts of the process. In the normal method reparative processes commence from the moment the physical disturbance of the part ceases and the bleeding is checked. Here the minimum of reparative material is requisite, and the wound is said to heal by first intention, by simple adhesion, or by aseptic inflammation (obsolete expression), because it is possible only in the absence of infection. Where infection occurs the reparative processes are interfered with and thwarted, reverting eventually to those seen in the absence of suppuration, but vast quantities of reparative materials are wasted, unnecessary tissue-destruction results, and the subsequent changes in the excessivly developed germinal tissue often cause serious interference with function. Healing is here said to have taken place by granulation or by second intention, but the end processes are the same in both forms." (Roswell Park, "Treatise on Surgery." p. 350.)

When irritation goes beyond that of the mere stimulation of function this description of repair seems to cover every field, at least up to our present knowledge, and especially that of pyorrhea alveolaris.

Gums and Alveolar Process.—In the discussion of interstitial gingivitis, so-called pyorrhea alveolaris, the process of repair, as above described, is the important factor, as it is in all lesions, the exciting cause having been determined.

The local destructive metabolism in this disease is identical with

that of any like tissues. Where constant ineffectual efforts are being made to extrude or absorb noxious foreign bodies we have like results, namely, destruction of much of the surrounding tissues. In gingivitis the foreign body, in the incipiency of the disease, is nearly always a calcareous deposit.

To Talbot more than to anyone else is due our most intimate knowledge of this disease; his extended researches and observation of the disease in man and animals, and his experiments on dogs, bring the matter close under our observation. In his "Conclusions" he says ("Interstitial Gingivitis," p. 148): "The mass of evidence previously presented demonstrates that the causes of interstitial gingivitis are divisible into predisposing causes (which may be subdivided into local predisposing and constitutional) and exciting causes. The exciting causes are either constitutional or local, but as a rule are local or have local action. * * * The predisposing factors of this disease, as already mentioned, are conditions of jaw evolution, transitory nature of certain structures, degeneracy, and conditions of previous irritation and inflammation."

In his mercurialization of dogs for the study of the production of the disease by drugs ("Interstitial Gingivitis," p. 117), he says, "Care was taken to secure those in health and with healthy gums." I should deem it a practical impossibility to know that there was absolutely no deposit about the teeth of these dogs, and think it fair to assume that there must have been some deposits, however small, since domesticated dogs, like men, all have calcareous precipitations about the teeth to some degree. It may not be malignant in its tendency until the etiological moment has arrived, the other factor being lessened resistance by other morbid systemic conditions.

Slight irritation from calcareous deposits may remain *in statu quo* for years, and finally a general morbid condition arrives, or rises to such a pitch that pyorrhea alveolaris or other advanced conditions of interstitial gingivitis are produced. The inflamed condition of the tissues about the teeth in interstitial gingivitis, it seems, is simply a continual effort at repair, which repair cannot be accomplished on account of the presence of calcareous deposits, or the phagedenic progress of a pus cavity about the roots, the pyorrhea alveolaris stage. Thus it happens in these cases, as in others, that nature thwarts her own object in her attempt to accomplish it, and destroys much of the surrounding tissue.

The writer's conception of interstitial gingivitis is that it is essentially local in its exciting cause, and that it has only systemic symptoms for the same reasons that other lesions may have auto-intoxication as one result. There seems no reason to believe that drug poisoning or other morbid systemic conditions can produce interstitial gingivitis unless a lesion of the gum pre-exists. This lesion may be the merest break in the mucous membrane, caused by the smallest deposit of this irritating material, this local mechanical irritation being one requisite of the etiological moment. On the other hand, there may frequently be found in gingivitis the systemic disorders accompanying cases of sapremia and septicemia.

The continual pressure against the gum tissues of rough irritating calcareous deposits, which continuously increase in quantity and insinuate themselves deeper and deeper beneath the soft tissue, is accompanied with all the products of repair by granulation, or second intention, as described by Nancrede, and may be accompanied with surgical fever. These deposits may be found wherever saliva can penetrate. It has never been the writer's privilege to see about the necks of teeth deposits of tartar that were innoxious, but they are always irritating to some degree and usually greatly so. This condition may exist in all stages, from that of being imperceptible to the naked eye up to a complete stage of pyemia, and may result in death.

In one case which came under my observation death resulted. The culminating cause in this instance was no doubt due to the exposure of more bone by the extraction of a molar while the gums and alveolar process were in the worst possible state. When the patient was presented to me exfoliation was going on and much bone was exposed, and the patient had a high septic fever. The septic condition was recognized, and advice given against extraction. The patient, however, was suffering greatly with a lower first molar, and went elsewhere to have the tooth removed. I was called again later, but the patient was past recovery, and died within ten days after the extraction.

There is abundant evidence to show that autointoxication, or a low state of health from any cause, greatly favors the progress of the disease, and with this condition present a chronic pus-forming condition may soon be found about one or more of the teeth where the local exciting cause exists, but that autointoxication or other

systemic disorders cause this disease, without local irritation, does not appeal to the writer's reason any more than to say that the same disorder causes inflammation of the pleura or conjunctiva without a local point of least resistance from local cause.

Degeneracy or faulty development may bring the etiological moment at a very early stage of the local irritation. This might be almost coincident with the initial lesion, whereas, in normal and healthy individuals, the pyorrheal stage, even in its mildest form, may be deferred indefinitely, or never appear even where calcareous deposits are excessive.

The fact that the tissues involved are transitory in nature does not seem an adequate factor in accounting for the disease, as suggested by Talbot, since they are as transitory in cases where the disease does not exist as where it does, and these tissues recover as readily as other structures which are not transitory.

There seems no question but that calcareous deposits about the teeth should be looked upon as noxious foreign bodies, and that the constant effort on the part of the tissue to extrude them results in the progressive death of the surrounding tissue. We find in this disease zones of granulation tissue, with the result of destructive metabolism in the soft tissues and the creation of sequestra in the bone. This condition, however, is changed to constructive metabolism the moment the tartar, sequestra, or other local irritants are completely removed.

Sequestra.—The removal of sequestra by nature is described by Roswell Park as follows: "A sequestrum may include an entire bone, shaft, or epiphysis, or only a small fragment. A given portion of the bone, having lost its vitality, becomes properly a foreign body which the surrounding tissues endeavor to extrude or to wall off and surround. The extrusive effort is the one which is usually seen. This is done by the continued presence of granulation tissue, which gradually perforates the surrounding bone at places of least resistance, the result being the slow formation of a sinus or several sinuses, ultimately connecting with the surface." This description, from my point of view, is a very good definition of the pyorrheal stage of interstitial gingivitis. So long as the tartar is present as a foreign body the irritation is continuous and sequestra are formed, which are a second source of irritation until they are removed or absorbed.

These cases will all heal by removal of the deposits and seques-

tra, or by the loss of the tooth. The removal of the teeth invariably results in recovery, and a patient without teeth, either young or old, cannot have the disease, regardless of transitory structures, degeneracy, heredity, drugs, environment, or systemic disease. If lesions of the gums or maxillary bones appear where there are no teeth, it is not interstitial gingivitis, but something else.

Discussion. *Dr. E. S. Talbot,* Chicago: I am obliged to take issue with Dr. Fletcher in a number of points. While it is possible that gutta-percha will be tolerated at the apical foramina more readily than a steel broach, yet to understand the pathology arising from such irritant we must first take into consideration the structures involved. We cannot compare the peridental membrane and the alveolar process with other structures of the body. The alveolar process is a transitory structure; the tooth to a certain extent is a foreign body. The alveolar process and peridental membrane, unlike the other structures, have not come to stay. The former is waiting for the least irritation to set up absorption and destruction of the peridental membrane. While it may tolerate gutta-percha better than metal, in either case the irritation produces absorption and destruction. It will not encapsulate foreign substances like other tissues. I have demonstrated this many times in many ways. Neither can we contrast a pulp like that of a human tooth with that of an elephant's tusk or a pulp that is persistent, as I showed in my paper last year. The pulp is practically a degeneration, even in health. The expansion and contraction are nil, hence pulp-stones and frequent inflammation resulting in abscess of the pulp without pain. The restricted portion of the apical end of the root restricts repair. The constitutional causes of interstitial gingivitis have local action because the gums are a secretory structure, and because of the transitory nature of the gums and alveolar process, next to the nervous system, they are always the first involved. The arteries, nerves, and veins terminate in this structure. They come up against a blank wall or nearly foreign substance (the root of the tooth), hence it may be called a terminal structure. I agree with the essayist that tartar invariably produces interstitial gingivitis, and in that case is entirely local in its origin, but the constitutional variety may best be illustrated in something like eighteen or twenty syphilitics that I have had in my practice for a number of years. By local treatment I am able to practically restore the gums and alveolar

process to health, and the patients leave my office after a given length of treatment "feeling fine," but they invariably return, sometimes in six months, a year, or two years, with marked interstitial gingivitis. No matter how well the patient may be in a general way, here we have marked illustrations of the constitutional variety. What is true of syphilitics is also true in consumptives and diabetics, and in autointoxications of all varieties. The calcareous deposits are no doubt irritating to the surrounding tissues. They should in all cases be removed.

Dr. A. E. Baldwin, Chicago: I am not sufficiently conversant with many of the points made by the essayist and Dr. Talbot to discuss them in their entirety and should want to thoroughly digest the material presented before I would feel competent to discuss it intelligently. There are one or two things in the discussion by Dr. Talbot that strike me from a little different standpoint, and this brings me to the point spoken of in our Saratoga meeting. I think we as a profession, belonging to the great medical ranks, ought to define our premises a little more closely than we do, and then we could have much more intelligent and accurate discussions. For instance, we speak of degeneracy being a change from the normal. The first essential is to fix upon the data for the normal. Without this we would be discussing largely in the dark, because every one's standpoint would be different as to the point taken for normal. The statement has been made that the pulp itself is a degenerate condition. Before I could accept any such statement I should want to know very definitely what is considered normal.

The essayist speaks of the tolerance of the tissues for certain things, and mentions an illustration of seventeen years' standing. I think his position that there is an apparent tolerance is well taken. I had a similar case in my own experience in a left lateral superior incisor. After two or three years I removed it because I was conscious, in examining the mouth, of a little projection under the lip. There was no irritation. I removed the substance and intended to make an examination of it, but in the moving of my office it was lost.

Dr. G. Lenox Curtis, New York: The tolerance of the tissues for foreign substances varies, according to the nature of the substance. The doctor has brought that out very clearly and demonstrated that a bullet or similarly irritating substance can be toler-

ated for a long time. I have in mind a case brought to my attention of a child who stepped upon a headless pin, and by the time a physician reached the house it could not be found. Three physicians consulted upon the advisability of operation, but did nothing, and three months later the pin came out at the hip. The patient found that the clothes were cut. There was slight inflammation, and the pin was pulled out by the trephine, and no trouble resulted from the accident. I know a gentleman who has a very large hypodermic needle, an aspirating needle, in his leg, and it has been there for some twenty years. Evidently it has lodged against the bone and does not take the usual course of passing through the tissues. I suggested the use of the X-rays, but he said he did not want them, and that he would be more comfortable if it were not located, as he was in good health.

I cannot agree with the point taken by Dr. Talbot as to the tooth being a foreign substance, unless perhaps he considers the tooth a degenerated foreign substance. I believe that when the tooth begins to develop it begins to degenerate.

I think gutta-percha is better tolerated than any other substance. Some instructive lessons might be gained from the use of the X-ray.

The syphilitic phase of interstitial gingivitis is one that for many years has interested me. I have felt that many if not all the recurrent cases of gingivitis are due to syphilis. When the inflammatory process returns after carefully administering proper treatment I have found that the cases usually do well under syphilitic treatment, and in a great many such cases have proved beyond doubt the presence of syphilis. It has not always been acquired by the patient, but is sometimes inherited. We know that the child of a syphilitic parent, either father or mother, has syphilis. It is a positive fact that the children inherit the diseases of the parent which are present at the time of conception, and that the mother usually becomes diseased at the time of gestation. These cases are perhaps the most difficult to treat because of the lack of definite knowledge. I have gained my knowledge more particularly through the study of life. A germ or spore of syphilis is detected in the blood. A Russian explained this in his text-book written long ago, but being before the time of the microscope, he was unable to give us definite data by which we could conduct our experiments. I be-

lieve that wherever I find the syphilitic spore the patients bear the mercurial treatment well, and if placed upon very mild preparations of small doses of the red oxid or biniodid of mercury they do well. I usually give a sixteenth of a grain three times a day, increasing it two or three times. If the treatment is persisted in for months you can eliminate the degenerative condition which maintains this syphilitic gingivitis.

Dr. M. L. Rhein, New York: I was especially pleased with a few little technical points in the essay. We have at times been accustomed to the use of terms that were rather exaggerated, and I was much pleased to hear Dr. Fletcher make use of the term "sapremia," instead of septicemia. I am convinced that we get very few cases of real septicemia such as the one he cited, which is a distinctive exception to the general run of cases which are sapremic in their nature. We are here for discussion, and from a surgical standpoint I take exception to the view of the essayist regarding the after-effects of extraction of a tooth under the circumstances cited. I cannot conceive of a case of this nature in which surgical interference can be objectionable or be a potent cause for evil. I was considerably astonished to see the essayist take the view which he did—that the extraction of this tooth may have had or did exercise a considerable bearing on the fatal ending of the case. It seems to me contrary to all the accepted surgical principles at the present time. Furthermore, it brings up the question frequently met with, whether because of the presence of pus it is not advisable to delay the extraction of a tooth, supposing it to be determined upon. This is a question well worth the consideration of this Section.

I agree with the essayist, and am opposed to the view of Dr. Talbot of the tolerance of foreign materials in the vicinity of the peridental tissues. My own clinical experience with the use of gutta-percha, and my examination and careful observation of hundreds of cases, lead me to coincide very thoroughly with Dr. Fletcher that gutta-percha is tolerated in the most remarkable manner by the soft tissues. I could cite a number of interesting cases bearing out this view. If there is a substance which the tissues will tolerate more freely than gutta-percha it is perfectly fused porcelain. I have demonstrated that by the magnificent tolerance shown by the tissues in the amputation of a necrosed root from one of the multirooted teeth, attaching a porcelain root to such a crown. The observation

of these cases for three or four years shows such a remarkably normal type of healthy gum tissue around the porcelain root as to thoroughly endorse the general proposition laid down by the speaker.

I rather regret that Dr. Curtis brought my name into his view of the syphilitic origin of so many cases of interstitial gingivitis. While I am thoroughly aware that syphilis plays an important role as a cause of peridental pathological conditions, I am totally opposed to the extreme view that Dr. Curtis takes on this question, in which he says that almost all cases of recurrent pyorrhea or interstitial gingivitis will show a distinct syphilitic origin. I also do not coincide with his views that the syphilitic germ can be for a certain number of years demonstrated in the blood. Dr. Lisquaid claimed to have made this discovery twenty-five years ago, but it is well known that the matter is disputed at the present day. The point hinges upon our ability of diagnosing a preexisting syphilitic state by a blood examination, and I do not care in any implied way to appear as accepting the view laid down by Dr. Curtis.

Dr. Hans Pichler, Vienna: Besides gutta-percha, paraffin is well tolerated, as the large surgical uses of this substance show. Dr. Trauner of my city has used it for the filling of old cavities with open foramina before the development of the teeth is completed, and he has had good success.

Dr. Curtis: I think the question of extracting the teeth in the presence of inflammatory processes would depend entirely upon the individual case. You can lay down no rule whatever for such extraction. In this case I have no doubt the extraction did much to hasten the fatal ending. I think there evidently was an acute inflammation or acute infection lighted up by reason of opening new tissue to this disease, against which the physician and patient were battling. I therefore believe it better to temporize with these cases and try to tolerate this inflammatory process until the greater part of the other trouble has been disposed of. Ordinarily speaking, I think the extraction of these teeth is wise, but never when the extraction is liable to extend the inflammation.

Dr. George F. Eames, Boston: It seems to me that the opposite views expressed on this paper have a great deal of truth in them, because we can all recall in our experience cases of great tolerance of the substances named by the essayist. We can also recall instances in which there has been little tolerance to foreign bodies,

and when Dr. Talbot said that when we consider the tolerance of foreign bodies in these tissues we must take into consideration the structures involved, he would have done well if he had said we must take also into consideration the general condition of the individual. It seems to me that explains the very great difference of patients in tolerating not only foreign bodies, but all toxic irritating substances. The case of death to which reference has been made I think should not be called rare. I believe there are a great many cases of death from autointoxication from this condition of inflammation in which pus is swallowed and fresh infection caused, and in which the diagnosis has been entirely different. I remember a case in which a patient suffering from gingivitis made the remark that she was in no fit condition to go to a dentist. My answer was that if she did not see fit to come to a dentist, she would have to have the undertaker. The attending physician did not realize that the condition of the mouth was bringing death to the patient.

As to the extraction of teeth in the condition named by the essayist, while it would seem that the surgical principle of removing the irritant at once should obtain in most dental cases, yet we have on record a number of cases in which very serious results have followed the extraction of teeth. We have to recognize that when another tooth has been extracted the poison has continued and great destruction followed. I believe this must be due to fresh infection of a surface reopened, and that there is some truth in the statement that we should get rid of the infection by some other means.

Dr. Rhein: I feel from considerable observation that all such cases as stated by Dr. Eames and Dr. Curtis are not due to the question of extraction, but to the faulty surgical treatment involved.

Dr. W. E. Walker, New Orleans: I have always felt, in cases in which death was stated to be due to extraction, that the position just taken by Dr. Talbot is a correct one—that death is not due to extraction, but to the faulty technique. Who can say in many cases that death would not have resulted had extraction not been done. In many of these cases of osteomyelitis simply removing the tooth is not sufficient. The marrow of the bone is permeated and should be treated. The whole mouth should be treated with antiseptics, and the socket as well. Considering the tooth as a foreign substance, as Dr. Talbot has said, and as being the cause of gingi-

vitis, is, I think, placing the cart before the horse. I believe if we were to use the word inflammation more carefully, and not consider as inflammatory conditions those which are simply passive hydremia, we would be more correctly understood. In cases of so-called gingivitis or Riggs' disease, in the early stages, I believe the tooth primarily is not an irritant, is not a cause, and is not a semi-foreign substance, but that the disease is due to some local condition, together with lack of exercise calling for proper nourishment. Again, there is some systemic condition. In the majority of cases we have an accumulation of the blood on the venous side of the circulation, and because there is not the normal stimulus due to mastication the faulty general circulation becomes more manifest in the gum tissue. There is a lack of the normal stimulation of the vasomotor system, and this passive hydremia keeps the tissues overfilled with blood of a venous variety which does not contain oxygen, and the tissues, though abundantly supplied with blood, are starved. The condition may be likened to Canal street, where there may be a great mass of people but less business being done than if there were but half the number on the street. We know that the cementum contains hundreds of layers which have been put on during the life of the individual. This seems to demonstrate the fact that the fibers of the cementum have but a limited life, that they cannot hold on indefinitely to that tooth and hold it in its socket, and that additions of fresh cementum entangle fresh fibers to hold the tooth. The old fibers lose their life and a separation occurs. The connective tissue is exposed, and we have weeping of the serum. The bone is not nourished, and this serum in oozing out contains more lime-salts than the serum would ordinarily contain, more than the blood would contain. There is the additional mechanical irritation of the calculus, and a separation of the tooth results.

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Dr. Fletcher, closing: Dr. Talbot's position as to the transitory condition of the alveolar process of the tooth seems to me to apply to the hair and nails, to the tubercle, the pulling of the muscles. I think the law is established that where you have the

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The matter of systemic production of interstitial gingivitis by medicines, by syphilis, or by other systemic causes seems to me so absolutely difficult to prove that I must take the opposite position until it is proved. I should like to see a series of experiments carried on bacteriologically with the infection of the healthy gum. We would then have a basis for an opinion. While I admit that the gentlemen have reasonable grounds for their opinions, I feel that I have reasonable grounds for the other side.

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Dr. Rhein: Do you suppose with the condition of the worst possible kind that after removal of the tooth, if the proper germicidal agents were kept in that socket for a sufficient length of time, there would be any possibility of infection in that particular case?

Dr. Fletcher: I think so, because I believe it is practically impossible to sterilize an open bone unless you have removed it. The deeper you scrape the deeper and larger the blood-vessels in that bone get to be, and I believe that the blood clot may become septic in the mouth. I may be wrong, but I do not see how we would be able to make such a condition absolutely aseptic. I will admit that if it

could have been kept perfectly aseptic this might not have added to what I believe was the cause of death. I think the extraction of the tooth with the addition of the septic condition turned the case downward instead of allowing it to recover.

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The breadth and importance of the subject I am about to discuss render an exhaustive study of it impossible in a short essay, but I mean to touch upon some of the most salient points regarding the care and preservation of these organs. Probably no one class of teeth has been the object of more study or the subject of more papers than the first permanent molars; nor is there any other class which causes the conscientious dentist more anxiety and perturbation of mind. Speaking in general terms, it is the most ill-fated member of the dental colony and might almost be termed the "Ugly Duckling."

How many times in examining the mouths of new patients do we see the first molars carrying large fillings of gold or amalgam, or even a gold crown standing out in glaring contrast to a set of teeth otherwise comparatively perfect? It is the rule rather than the exception that we find the condition mentioned, and granting the truth of the statement, let us seek some of the causes of the first molars' weakness.

These teeth often come into evidence under most unpropitious circumstances—at a time when the little patient may be suffering from one or more of the many childish ailments which an unkind fate seems to have prescribed to keep the growing child from being too happy. The processes of nutrition are disturbed and the secretions may be perverted, owing to a lack of coordination in the performance of their physiological functions by the different organs of the body.

The tooth, already handicapped by defective ossification, and possibly to some extent by the complexity of its masticating surface, makes its way partially through the gum, a flap of which is very apt to remain, covering the distal portion of the occlusal surface for weeks and in some instances for months, inviting the lodgment and fermentation of small particles of saccharin and starchy food.

The position of the tooth in the oral cavity, standing as it does posterior to the second temporary molar and in close contact with the soft tissues, is not to be lost sight of when considering the predisposing causes of disintegration.

The irregular and complex formation of the occlusal surfaces of these molars, with their many pits and imperfectly calcified fissures in which germination and acid fermentation progress without disturbance, is another contributing cause of early caries.

More often than not the posterior proximal surface of the second temporary molar is attacked by caries before it is shed, and through its close contact with the mesial proximal surface of the first permanent molar the latter becomes more or less involved.

The superior and inferior teeth are affected alike by all of the influences mentioned in the foregoing, but it is a fact that the inferior molars, which are the more irregular in formation and subject to the more noticeable accumulations of debris owing to the influence of gravitation, suffer the most, according to my observation.

If it were possible to carry out an ideal course of oral hygiene and dental prophylaxis in the mouth of the growing child we might battle successfully with some of these unfavorable conditions, but when we admit, in spite of ourselves, that an ideal and constant condition of cleanliness in the mouths of growing children is a practical impossibility in the majority of cases at least, we have bowed to the inevitable, and after having done all in our power to educate the patient, the parent and the nurse in the care of the mouth and teeth we must, perforce of necessity, accept the conditions as we find them.

In a cursory way some of the more important causes of the early decay of the first permanent molars have been reviewed, and in the second division of this brief essay ways and means for the preservation of these teeth will be considered.

In the management of children it is desirable to have them begin their dental experience at the age of three or four years, and in some cases it becomes necessary to treat caries even earlier than that. The average child is kept out of serious dental trouble if seen twice or three times a year, and at about six years of age, when the first permanent molar erupts, is fairly well under the control of the operator.

These teeth vary to such an extent in their structural characteristics that no hard and fast rule which will apply to all cases can be suggested, but when two-thirds of the crown is exposed in the

process of eruption a careful examination will reveal defective fissures and pits in the majority of cases. If decalcification is present to any appreciable extent it becomes necessary to scrape out the fissures with a very fine excavator before filling, but in many cases the occlusal surface is cleansed with alcohol, dried with warm air, and protected by a small pad of oxyphosphate of zinc cement which before it crystallizes is pressed firmly into place with the end of the finger.

In many cases where the tooth is perfectly sound, so far as the eye and sense of touch can discover, this same process is carried out as a prophylactic measure, and oftentimes such an application will last two or three years. At the end of which time, when the cement may be completely washed out, it is found that no filling of any kind is needed on the occlusal surface.

When the defects are more definite in character and outline, permitting the entrance of exploring points or excavators, the use of tin foil at once becomes a blessing to the patient and operator. These fissures may be scraped out with a fine excavator, or deepened slightly with a very small bur in the engine, thus making it possible to insert tiny tin fillings with comparative ease, even under the unfavorable conditions that prevail in the mouths of children. In addition to their lasting properties, these little plugs of tin possess a therapeutic quality that is of great value in teeth where the tendency to caries is marked.

This method is suggested for small cavities only, as in larger ones on the surface we are now considering the manipulation of tin becomes more arduous, and the tendency of larger tin fillings to cup out and rapidly wear away when exposed to mastication makes them of questionable value.

The little pits and grooves on the buccal surfaces should be filled with tin, gutta-percha or cement, according to the discretion of the operator. Often a buccal pit or groove prepared by the use of a No. ½ rose-head bur, and filled with tin, will last and protect the area it was intended to serve until the period of adolescence is reached. Pink gutta-percha is almost as lasting in a fine groove on a sheltered surface, and cement is also serviceable but less reliable in the ultimate.

When the occlusal cavities are larger and involve considerable of the masticating area of the tooth they are filled with cement and

periodically renewed with a view to inserting gold at a later date when the work can be done under more favorable circumstances.

It will be noticed that simplicity in operative procedure is the main feature in all the suggestions offered up to this point, but we will assume that we now have to deal with a patient in age from ten to twelve years, which is about the time when the second temporary molar is lost, preparatory to the eruption of the second permanent bicuspid.

Even in the most carefully regulated practice there is a tendency on the part of some parents and guardians to be lax in regard to the periodical examination of the children under their care, but at the time when it is expected that the second temporary molar will be shed they should be urged to be particularly watchful and to bring the child at the earliest possible moment after its loss.

The mesial approximal surface of the first permanent molar is now exposed to full view, and any operation that may be necessary can be done with greater facility than at any future time, the absence of the second temporary molar giving freedom of access to the surface that is most advantageous.

It is probably safe to say that in the majority of cases the anterior approximal surface of the first permanent molars exhibits at this time a cavity of decay, or at least a spot of decalcified enamel which should be treated as a cavity and thoroughly cut out and filled. If the defect is simply a slight discoloration in the enamel it is good practice to polish the surface with disks and wood points, leaving a perfectly smooth finish, but if after careful examination the operator decides that a filling is necessary, then comes the question of what kind of a filling should be inserted. In the treatment of every cavity the choice of a filling material is a problem, but in this case it is a matter of particular importance, and usually, in view of present and future considerations, a gold filling is decided upon as the best and safest means for the permanent preservation of this surface.

Up to the present time all dental operations have been performed as easily and pleasantly for the patient as possible, but now the kindness and tenderness that the operator naturally feels for these little people must be tempered with wisdom and sterner judgment, and the work be carried out with all the care and thoroughness and careful attention to detail that is necessary to make a gold filling a permanent success. This is likely to be the first real test of the patients'

vitis, is, I think, placing the cart before the horse. I believe if we were to use the word inflammation more carefully, and not consider as inflammatory conditions those which are simply passive hydremia, we would be more correctly understood. In cases of so-called gingivitis or Riggs' disease, in the early stages, I believe the tooth primarily is not an irritant, is not a cause, and is not a semi-foreign substance, but that the disease is due to some local condition, together with lack of exercise calling for proper nourishment. Again, there is some systemic condition. In the majority of cases we have an accumulation of the blood on the venous side of the circulation, and because there is not the normal stimulus due to mastication the faulty general circulation becomes more manifest in the gum tissue. There is a lack of the normal stimulation of the vasomotor system, and this passive hydremia keeps the tissues overfilled with blood of a venous variety which does not contain oxygen, and the tissues, though abundantly supplied with blood, are starved. The condition may be likened to Canal street, where there may be a great mass of people but less business being done than if there were but half the number on the street. We know that the cementum contains hundreds of layers which have been put on during the life of the individual. This seems to demonstrate the fact that the fibers of the cementum have but a limited life, that they cannot hold on indefinitely to that tooth and hold it in its socket, and that additions of fresh cementum entangle fresh fibers to hold the tooth. The old fibers lose their life and a separation occurs. The connective tissue is exposed, and we have weeping of the serum. The bone is not nourished, and this serum in oozing out contains more lime-salts than the serum would ordinarily contain, more than the blood would contain. There is the additional mechanical irritation of the calculus, and a separation of the tooth results.

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If it were possible to carry out an ideal course of oral hygiene and dental prophylaxis in the mouth of the growing child we might battle successfully with some of these unfavorable conditions, but when we admit, in spite of ourselves, that an ideal and constant condition of cleanliness in the mouths of growing children is a practical impossibility in the majority of cases at least, we have bowed to the inevitable, and after having done all in our power to educate the patient, the parent and the nurse in the care of the mouth and teeth we must, perforce of necessity, accept the conditions as we find them.

In a cursory way some of the more important causes of the early decay of the first permanent molars have been reviewed, and in the second division of this brief essay ways and means for the preservation of these teeth will be considered.

In the management of children it is desirable to have them begin their dental experience at the age of three or four years, and in some cases it becomes necessary to treat caries even earlier than that. The average child is kept out of serious dental trouble if seen twice or three times a year, and at about six years of age, when the first permanent molar erupts, is fairly well under the control of the operator.

These teeth vary to such an extent in their structural characteristics that no hard and fast rule which will apply to all cases can be suggested, but when two-thirds of the crown is exposed in the

process of eruption a careful examination will reveal defective fissures and pits in the majority of cases. If decalcification is present to any appreciable extent it becomes necessary to scrape out the fissures with a very fine excavator before filling, but in many cases the occlusal surface is cleansed with alcohol, dried with warm air, and protected by a small pad of oxyphosphate of zinc cement which before it crystallizes is pressed firmly into place with the end of the finger.

In many cases where the tooth is perfectly sound, so far as the eye and sense of touch can discover, this same process is carried out as a prophylactic measure, and oftentimes such an application will last two or three years. At the end of which time, when the cement may be completely washed out, it is found that no filling of any kind is needed on the occlusal surface.

When the defects are more definite in character and outline, permitting the entrance of exploring points or excavators, the use of tin foil at once becomes a blessing to the patient and operator. These fissures may be scraped out with a fine excavator, or deepened slightly with a very small bur in the engine, thus making it possible to insert tiny tin fillings with comparative ease, even under the unfavorable conditions that prevail in the mouths of children. In addition to their lasting properties, these little plugs of tin possess a therapeutic quality that is of great value in teeth where the tendency to caries is marked.

This method is suggested for small cavities only, as in larger ones on the surface we are now considering the manipulation of tin becomes more arduous, and the tendency of larger tin fillings to cup out and rapidly wear away when exposed to mastication makes them of questionable value.

The little pits and grooves on the buccal surfaces should be filled with tin, gutta-percha or cement, according to the discretion of the operator. Often a buccal pit or groove prepared by the use of a No. ½ rose-head bur, and filled with tin, will last and protect the area it was intended to serve until the period of adolescence is reached. Pink gutta-percha is almost as lasting in a fine groove on a sheltered surface, and cement is also serviceable but less reliable in the ultimate.

When the occlusal cavities are larger and involve considerable of the masticating area of the tooth they are filled with cement and

periodically renewed with a view to inserting gold at a later date when the work can be done under more favorable circumstances.

It will be noticed that simplicity in operative procedure is the main feature in all the suggestions offered up to this point, but we will assume that we now have to deal with a patient in age from ten to twelve years, which is about the time when the second temporary molar is lost, preparatory to the eruption of the second permanent bicuspid.

Even in the most carefully regulated practice there is a tendency on the part of some parents and guardians to be lax in regard to the periodical examination of the children under their care, but at the time when it is expected that the second temporary molar will be shed they should be urged to be particularly watchful and to bring the child at the earliest possible moment after its loss.

The mesial approximal surface of the first permanent molar is now exposed to full view, and any operation that may be necessary can be done with greater facility than at any future time, the absence of the second temporary molar giving freedom of access to the surface that is most advantageous.

It is probably safe to say that in the majority of cases the anterior approximal surface of the first permanent molars exhibits at this time a cavity of decay, or at least a spot of decalcified enamel which should be treated as a cavity and thoroughly cut out and filled. If the defect is simply a slight discoloration in the enamel it is good practice to polish the surface with disks and wood points, leaving a perfectly smooth finish, but if after careful examination the operator decides that a filling is necessary, then comes the question of what kind of a filling should be inserted. In the treatment of every cavity the choice of a filling material is a problem, but in this case it is a matter of particular importance, and usually, in view of present and future considerations, a gold filling is decided upon as the best and safest means for the permanent preservation of this surface.

Up to the present time all dental operations have been performed as easily and pleasantly for the patient as possible, but now the kindness and tenderness that the operator naturally feels for these little people must be tempered with wisdom and sterner judgment, and the work be carried out with all the care and thoroughness and careful attention to detail that is necessary to make a gold filling a permanent success. This is likely to be the first real test of the patients'

ability to stand the pain and discomfort of a radical operation, but as a rule they are at this time sufficiently advanced to appreciate the situation and submit as gracefully as they can.

After the rubber dam is applied the cavity should be cleaned out and freely extended to include all of the affected area, and when finished the cavity should present sound margins which have been well beveled and smoothed by the use of a plug finishing bur in the engine. When such a cavity is carefully filled with gold and the rubber dam is removed, the operator may stand back feeling that he has done a good work, and in so far as dentistry may be considered permanent that he has performed a permanent operation.

It would be interesting at this point to go into the consideration of extension for prevention, the use of amalgam and gutta-percha and other details, but this essay deals with the care of the first permanent molar in a general way only, and now the refilling or replacing of the temporary fillings which were inserted in the early life of the tooth claims our attention. Now that the patient is older and able to reason, and is better able to stand fatigue and discomfort, it is desirable that the temporary fillings should be replaced with gold as soon as may be convenient and practicable, if the tooth is of a quality that will warrant its insertion.

One or two sittings in the fall and one or two in the spring devoted to the care of these teeth will soon find all cavities filled with gold; and as the patient is now paying more attention to prophylaxis, and as the environments of the tooth have improved, the outlook for its healthful and useful career is certainly promising.

All of the foregoing is meant to apply to the average case as presented in every-day practice—not to the ideal case where little or no attention is required, nor to the excessively bad case where caries is rampant, giving rise to an unhappy sequence of difficulties which have to be dealt with according to the judgment and discretion of the individual practitioner. But no matter what the extent of the caries or the difficulties of combating it may be, your essayist feels, in view of the present day knowledge of the priceless value of the first permanent molar, that every possible effort should be made to save it, or its roots at least, in a condition of health and usefulness.

Discussion. *Dr. James Truman,* Philadelphia: The first permanent molar has always been of great interest to me, and I am glad to see that the young men of today take a different view of the subject

than that held in former years. I remember having a discussion with Prof. Barker thirty years ago about this much abused tooth. He argued that it should be removed when decayed and that no attempt should be made for its preservation. He experimented on his young children, and I told him that when they reached adult life they would have spaces between their teeth as a natural result. I must differ with Dr. Tracy on two points. He states that tin is good only in small cavities and should not be used in large ones, but I hold that when properly manipulated tin will make as good a filling as gold in certain classes of cavities, even though they be of good size. In the latter part of his paper Dr. Tracy stated that after the tooth was carefully filled with gold the operator could feel that he had "done a good work and performed a permanent operation." Has he performed a good operation, and is gold a good filling material at that age? Why not use something in these cases that will last until the patients are twenty-one years of age and then talk of a permanent filling?

Dr. W. T. Reeves, Chicago: I quite agree with Dr. Truman that this is not the age for a gold filling to be considered permanent. A porcelain filling is the ideal one during this period, especially for the little patients, as it is so easy to insert. If we resort to carrying the tooth along with cement we endanger the second bicuspid, and by protecting that tooth we are protecting the area of possible decay. By employing a porcelain filling we remove half the liability and give protection to the surrounding tooth surfaces.

EPULIS.

BY W. CLYDE DAVIS, D.D.S., LINCOLN, NEB. READ BEFORE THE NEBRASKA STATE DENTAL SOCIETY, AT LINCOLN, MAY 19-21, 1903.

Epulis is an atypical cell-proliferation from a matrix of embryonic tissue of post-natal origin, arising from the pericementum or periosteum near its junction with that membrane. Histologically epulis is a recurrent malignant tumor, a sarcoma, fibrous at first, but with distinctive myeloid tendencies in its later stages.

Virchow recognized two forms, the hard and the soft; the character of the former being due to the predominance of fibrous tissues, and that of the latter to its vascularity. It would necessarily follow that in the latter we find a greater tendency to malignance.

Microscopically epulis differs little from other sarcomas, being

composed of round, spindle-shaped and giant cells. Yet there is a great difference in the appearance of sections from different tumors of the same class, owing to the varying amount of fibrous tissues and the relation in quantity of the different cells which enter into their composition, which difference is also manifest with each individual tumor in its successive stages. A section from a case of epulis which is of recent manifestation will show little variation from one made from a hypertrophied peridental membrane, while a section from the same tumor in its last stages will in no way resemble that tissue, showing a distinctive malignant type.

The etiology of epulis is of necessity two-fold—that is, if it is to be classified as sarcoma. First, there must be present within the tissue a matrix of embryonic fibroblasts. Second, there must come an irritant to stimulate the latent energy of cell-proliferation in this embryonic tissue. Some pathologists would attempt to show that epulis is benign, which would seem true in its initial stages, hence not from embryonic tissue; but all are agreed that it ends in a myeloid sarcoma if allowed growth. If this last be true, then epulis is malignant and of post-natal origin, else it and all other sarcomas and members of the cancer family are created, are the result of conditions after birth, and are in no way embryonic, which cannot be the case.

Those irritants which enter into its etiology are simple enough, and only such, in the absence of the embryonic tissue as the predisposing cause—reparative hyperemias, hypertrophies or tumefaction, all of which are most benign. Chief among these are the continued mechanical irritation of rough edges of cavities, roots of teeth, overhanging fillings at the gingivæ, deposits of calculus, traumatic injuries and chronic inflammatory conditions, any of which may be the exciting cause, while the presence of the embryonic tissue is the predisposing cause, both of which must operate to result in epulis.

With reference to the semeiology of epulis in its earlier stages, nothing seems to be pathognomonic, while in the advanced and later stages the symptoms are marked. The course of the disease is marked by an almost entire absence of pain. In the hard variety it resembles in every way a simple bone, periosteal or peridental tumor, and of such slow growth as to almost class it as benign, as the usual life of man is not long enough to reach this stage of malignance. In the soft variety the symptoms are different; at first it resembles a

simple tumefaction of the peridental membrane, but as it develops its changing color and tendency to hemorrhage upon the slightest touch are marked symptoms, and as its true sarcomatous nature begins to show up its surface breaks down, giving off the characteristic odor, and the hard bone-like cicatricial tissue base makes its appearance.

In the soft variety the color is first light pink, not unlike the mucous membrane surrounding it. This, however, soon changes to a brighter red. The surface becomes uneven, like a strawberry, which it sometimes resembles. Following this the hue darkens to one of a deep red, and in some instances to a brown. At this time the surface begins to break down, and its true color is obscured by a dirty white film which collects very rapidly upon its surface, whereas the color beneath is almost a black, due to a characteristic pigment deposit. The tooth or teeth from whose sockets it arises become much loosened and elevated in their sockets, and appear to be resting upon rubber-like cushions, and finally are literally exfoliated. The odor which sets in as the tissues begin to break down can be described only as "carrion-like," and is most nauseating, persistent and ever present.

Its clinical history is that there is noticed growing close to a tooth at its gingival margin first seemingly a hypertrophy, then a tumor, and if allowed growth from two to five years, it will suffice to present a fully developed sarcoma, generally myeloid in character.

Treatment is complete and radical removal, the earlier the better. In their incipiency they seldom recur, and are not often metastatic; however, in their latter stages a much larger per cent recur in the socket of another tooth, not previously giving evidence of affection. Those composed of the round cells are the most malignant, while the giant cells are the most operable.

RADICAL ORTHODONTIA.

BY W. H. HERTZ, D.D.S., HAZLETON, PA. READ BEFORE THE PENNSYLVANIA STATE DENTAL SOCIETY, AT WILKESBARRE, JULY 7-9, 1903.

Having treated a number of cases in orthodontia by the usual method of contraction and expansion, the following case is a radical departure on account of the age of patient, a woman about forty years old. Thinking it might be of interest to some dentists, and help them over difficulties that are sometimes hard to surmount, I bring it before you.

There was no malocclusion and but a slight contraction of the arch at the superior left first bicuspid, while the left superior cuspid and four centrals were abnormally large for the arch and the other teeth, and the right superior central protruded much beyond the left one. This last defect is found also in the mouths of several sisters of the patient. The irregularity interfered with speech to a marked degree, and the patient could not close the lips over the teeth without great effort.

The treatment was as follows—the four incisors were cut off, the pulps taken out, and Darby crowns made with round iridio-platinum pins, the latter being small in diameter so as not to weaken the roots. Teeth were then selected of a proper shade and size to fit the space. The plate on the root of the right lateral was allowed to extend slightly toward the labial, and the plate of the right central toward the palatal. By so doing the teeth were brought into alignment, while the left central and lateral were placed in a normal position on the roots, but were of a smaller size than the teeth cut off.

Darby instead of Richmond crowns were used on account of a family tendency to recession of gums, pyorrhea and elongation as age advances, thereby preventing the exhibition of the gold band.

This gave most artistic results, and the teeth have been doing work for the past seven years without accident, and are satisfactory to the patient.

Discussion. *Dr. H. E. Roberts,* Philadelphia: The method of correcting irregularities as described by the essayist is not new, but it is a radical procedure. If the teeth are in very bad condition I would advise excision, but otherwise not. Two years ago a woman came to my office whose teeth were protruding to such an extent that it made her appearance most repellent. She felt the deformity keenly, so much so that she would not go out of the house nor associate with anyone. She consequently became misanthropic and was one of the most nervous patients I ever had. I cut off all six of the anterior teeth, brought the gums to a healthy condition and crowned the teeth, thus correcting the malformation. The woman is now happy, healthy and enjoys life.

Digests.

FURTHER EXPERIMENTS RELATING TO THE QUESTION OF IMMUNITY. By W. D. Miller, D.D.S., M.D., Ph.D., Sc.D., Berlin. (See preceding article on this subject in DIGEST, June, 1903, p. 708.) The following conclusions are to be drawn from the results of the experiments published in the June DIGEST: 1. The mixed human saliva—whether filtered or unfiltered, in its normal state or condensed by evaporation over the water-bath or at the temperature of the human body—does not possess the power to prevent or retard processes of fermentation and putrefaction. 2. The potassium sulfocyanid does not possess any appreciable antiseptic action in the greatest strength in which it is found in the human mouth. 3. Growths of bacteria and fermentative and putrefactive processes take place in oral mucus quite as readily, if not more so, than in the mixed saliva of the same persons. 4. The saliva of immunes develops in the presence of carbohydrates on an average a little less acid than that of highly susceptible persons. The difference is, however, not constant, and not sufficiently marked to account for the marked differences of susceptibility. 5. The protective bodies (alexins) of the blood do not under normal conditions pass into the saliva in sufficient quantity to be detected by ordinary means. 6. Free acids produced by fermentation make their appearance in strongly alkaline saliva (horse) much later than in human saliva. 7. The struggle for existence probably performs an important role in protecting the mouth and the organism in general against the invasion of pathogenic microorganisms.

To these we may add—8. Bacterial plaques are essential neither to the beginning nor to the progress of caries, nor does their presence necessarily result in the production of caries. It is possible that they may intensify processes of decomposition in particles of food clinging to the surfaces of the teeth.

In the present communication I propose to continue the discussion of the problem, beginning with the following question: *Does the human saliva possess globulicidal or hemolytic action?*

In order to leave no means untried that might bring to light the bacterial properties of saliva, if such properties should be found to exist, I made a series of tests for determining its globulicidal properties; that is, its power of dissolving red blood corpuscles. It is

very generally known that the operation formerly frequently practiced of introducing the blood of animals (lambs) into the circulation of human beings has been abandoned, as it was found that among other deleterious effects it brought about a dissolution of the red blood corpuscles of the blood introduced as well as of that of the person under treatment. It has furthermore been ascertained that the blood serum of any animal possesses the power of dissolving the red blood corpuscles of man or of other animals as well *in vivo* as *in vitro*. The dissolving power of the blood serum may be indefinitely increased by a preliminary treatment of one animal, by injecting the blood serum of another. The increase of the globulicidal properties of the blood serum manifests itself, however, only toward the blood corpuscles of the animal which furnished the serum.

We see accordingly that a process takes place which has the greatest similarity to that which is observed when an animal is immunized against a certain kind of bacterium, and the substances which in the one case produce the immunity and in the other dissolve the red blood corpuscles have the greatest similarity—and in fact by Bordet and others are considered identical. Accordingly, much of the knowledge which we now possess regarding the question of immunity is based more upon experiments with hemolytic than upon those with bactericidal serums. It seemed to me, therefore, that some light might be thrown upon the question of the much-sought-for immunizing properties of saliva by experiments upon its hemolytic properties. Those experiments were carried out in the following manner:

The blood of a rabbit was collected directly from the jugular vein in a Florence flask containing some fifty sterilized glass beads, and defibrinated by briskly shaking. The defibrinated blood was then poured off and the red blood corpuscles separated by centrifugating. Five small drops of the red blood corpuscles were brought into each of a number of sterilized test tubes and 2 to 5 c.cm. of the liquid of which the hemolytic action was to be tested added. Unless the red blood corpuscles were dissolved at once the tubes were placed in an incubator for two hours, the tubes being shaken from time to time whenever the corpuscles were seen to have accumulated at the bottom. At the end of this time they were placed on ice or in a very cold place for some hours or over night. A solution of the red blood corpuscles is then indicated by a more or less pronounced red colora-

tion of the serum, amounting to a cherry red color where a total solution has taken place. The following substances (mostly constituents of the saliva) were tested, with the results indicated:

Solution of Red Blood Corpuscles.

Fresh saliva	*Immediate*	*total*	*solution*
Old "	"	"	"
Filtered "	"	"	"
Saliva heated to 60 degrees C.	"	"	"
" boiled	"	"	"
Fountain water	"	"	"
Distilled "	"	"	"
Ammonium chlorid, 1:1000	"	"	"
Potassium chlorid, 1:1000	"	"	"
Sodium chlorid, 1:1000	"	"	"
Sodium sulfate, 1:1000	"	"	"
Potassium sulfocyanid, 1:1000	"	"	"
Sodium glycocholate (all concentrations)	"	"	"
Sodium taurocholate (all concentrations)	"	"	"
Sodium cholate (all concentrations)	"	"	"
Potassium sulfocyanid, 1:100	*No*	"	"
Sodium chlorid, 1:100	"	"	"
Ammonium chlorid, 1:100	*Slight*	"	"
Pepsin	*No*	"	"
Trypsin	*Trace of*	"	"
Ptyalin	*Slight*	"	"
Urine	*No*	"	"

We see that the human saliva dissolves the red blood corpuscles of the rabbit under all conditions, as do also attenuated solutions of various salts of the saliva. It has been accordingly suggested that the hemolytic action of the saliva is due to the presence of certain salts. We see, however, that water also effects a complete and rapid solution of the red blood corpuscles, whereas no solution takes place in more concentrated solutions of the salts. Most salts, instead of dissolving the red blood corpuscles, prevent their solution, and it is probably owing to this fact that the red blood corpuscles are not dissolved in their own serum. Urine, which is a non-solvent, becomes a solvent for red blood corpuscles when it is diluted or the salts are removed by dialysis.

The pronounced hemolytic action of the saliva is accordingly due only to its water, and not to its salts or to any substance analogous to the alexins of the blood; since in this latter case boiling the saliva, or even heating it to 60 degrees C. for half an hour, would destroy the hemolytic power—which, as has been shown above, is not the case. In order, therefore, to determine whether the saliva really possesses any hemolytic bodies analogous to those of the blood, we must first eliminate the solvent action of the water. This is done by

adding a sufficient quantity of sodium chlorid to bring the tension of the saliva up to that of the blood, or about 0.75 per cent. Saliva to which 0.75 per cent of sodium chlorid had been added was found to have lost its hemolytic action almost completely, merely a slight solution occasionally taking place, which may be readily accounted for by the presence of ptyalin. These experiments must accordingly also be said to have resulted negatively.

We come now to the next question: *What role does phagocytosis play in the human mouth?*

In the ordinary processes of fermentation with their accompanying phenomena, in particular in caries of the teeth, the action of phagocytes scarcely comes into consideration, whereas in affections of the soft tissues of the mouth it may play a very important role. Hugenschmidt, working in the laboratory of Metchnikoff, obtained results which indicate that the saliva possesses positive chemiotactic properties. When capillary glass tubes, closed at one end, were filled with saliva and introduced under the skin, or into the abdominal cavity of rabbits, guinea-pigs, etc., the open end became closed by a dense plug of phagocytes inside of three hours, from which Hugenschmidt inferred that in case of open wounds in the mouth phagocytes must be attracted in great numbers by the saliva or by the bacteria which it contains. I have found also that the secretions of wounds produced by the extraction of teeth examined three to four hours after operation contain vast numbers of leucocytes, and that in many cases they are loaded down with bacteria, and must consequently greatly assist in keeping the wounds free from infection.

QUESTION—*Does the human saliva manifest any antiseptic action toward pathogenic bacteria?*

In my experiments relating to this question I tested the action of my own saliva upon the micrococcus of sputum septicemia (*Diplococcus pneumoniæ*). I chose to experiment with my own saliva because I have not been able to find the pneumococcus in it for the past few years, from which the inference is to be made that it is, in more than the usual degree, inimical to this microorganism; and if the human saliva possesses any bactericidal action whatever upon the micrococcus of sputum septicemia (pneumococcus) we should be able to detect it in my saliva with comparative ease.

The experiment was carried out in the following manner: Two watch-glasses were filled, the one with 1 c.cm. of saliva which had

been passed through two layers of ordinary filter paper, the other with 1 c.cm. of sterilized water. The contents of both glasses were then infected with three to four loops of blood from the heart of a mouse which had died but a short time before of sputum septicemia. Both vessels were allowed to stand for two or three hours, and then mice were infected subcutaneously with 0.2—0.3 c.cm. of the contents. Supposing the saliva to have a deleterious effect upon the micro-organisms (to destroy a certain number of them or to attenuate their virulence), then the animals infected from the watch-glass containing saliva should live longer than those infected with the micro-organisms which had been subjected only to the action of the water. In fourteen cases out of twenty-one the mice infected with pneumococci in saliva died sooner, in two cases at the same time, and in five cases later than those infected with pneumococci in water. From these results we can conclude only that the pneumococci retain their virulence in saliva at least as well as if not better than in water.

The results thus far obtained from my investigations seem to justify the conclusion that *the protective powers present in the human mouth are not to be accounted for by any antiseptic action on the part of the saliva, but rather by the phenomenon of phagocytosis, by the struggle for existence, and probably by certain forces residing in the soft tissues which have not yet been investigated.*

The question of the varying susceptibilities of different teeth to caries still remains an unsolved problem, upon which I hope that experiments now under way may throw some light.

Comparative Numbers of Bacteria in Different Mouths. The idea has been very naturally suggested that the conditions in different mouths may be favorable or unfavorable in varying degrees to the development of bacteria; that in the one we may have few compared with the other, and that the difference in the amount of caries may be explained thereby. I have made a few experiments relating to this question with the following results:

Patient.	No. of bacteria to loop of saliva.	Average.
1. Immune, clear saliva	56,650	64,987
2. " " "	93,000	
3. " " "	95,000	
4. " " "	15,300	
5. Slight caries, clear saliva	17,850	33,975
6. " " " "	50,100	

Patient.		No. of bacteria to loop of saliva.	Average.
7.	Moderate caries, clear saliva	36,400	61,870
8.	" " " "	30,950	
9.	" " " "	92,000	
10.	" " " "	95,000	
11.	" " " "	55,000	
12.	" " mucus and sediment	205,000	
13.	Highly susceptible, clear saliva	44,000	56,333
14.	" " " "	84,000	
15.	" " " "	41,000	

These results give little or no clue to a solution of the question, and show only that a large number of experiments must be made in order to arrive at any conclusion. I would advise a comparison of immunes with the highly susceptible only. On getting up in the morning, the teeth having been carefully cleaned the night before, the persons under examination should thoroughly rinse the mouth with sterilized water, using the same amount and carrying out the process in exactly the same way as nearly as possible. The rinsing-water should then be diluted with a liter of sterilized water, thoroughly shaken to distribute the bacteria equally, and then at least five different loops taken and five different agar plates made. The experiment might be varied in many ways which will suggest themselves to the experimenter, and I hope that someone will undertake the task, as I fear I shall not have the time for it. A large number of experiments would be necessary in order to arrive at definite results.

Experiments in the Mouth. In continuation of the experiments already reported (June, 1903, DIGEST) I caused capsules of celluloid to be constructed about ¾ inch long and ¼ inch in diameter. They were perforated by twenty-two small holes, filled with bread and tied to the teeth on going to bed. The reaction in the morning was found to be strongly acid, and—as far as could be determined by the litmus test—as much so in the case of an immune (Dr. York) as in my own case, who am of an average susceptibility.

Relation of the Quality of Saliva to Susceptibility. The opinion is very prevalent that a viscid, stringy saliva is conducible to caries, which is probably the case in so far as the self-cleansing process in the mouth is impaired by it. For some time I have paid attention to this question and have met with a number of cases of total immunity to caries in connection with very stringy saliva. Two Chinamen whom I recently examined were found to be quite immune but to

have extremely viscid saliva; in the one case so much so that it was not possible to pour a portion from one vessel to another, the whole of it dragging over like the white of an egg. Nor are these isolated cases. Again, I have met with many cases of extensive destruction of the teeth by caries in connection with very thin saliva. I am consequently inclined to the belief that on the whole the action of the viscidity of the saliva in the causation of dental caries has been somewhat overrated.

Relation of the Quantity of Saliva to the Question of Susceptibility. Undoubtedly a strong flow of saliva tends to a certain extent, except in deep cavities to which it scarcely penetrates, to dilute the acids produced by fermentation in the mouth, to wash away small particles of food, and to prevent their adhering to the surfaces of the teeth. How much this may be the case is exemplified by the following: A colleague applied to me for advice in the case of a patient who up to within a year or two had fairly good teeth. Recently, however, the teeth began decaying in a frightful manner, especially at the necks and along the free margins of fillings, where caries as a rule seldom occurs. The patient came to me in order that I might examine her saliva, and I gave her the usual ball of cotton to chew upon. After a futile attempt which was kept up for at least five minutes we gave up, having secured only a few bits of foam. On inquiring I found that the patient suffered continually from excessive dryness in the mouth and throat and had great difficulty in swallowing. We have here a sufficient explanation for the rapid progress of caries—all acids produced by fermentation not being diluted by saliva, and acting in full strength even on exposed surfaces.

The protective action of a free flow of saliva will manifest itself most on the free surfaces of the teeth, much less in deep cavities or spaces which are packed with food, and of course not at all during periods when the secretion of the saliva ceases altogether, especially in sleep. It is consequently a factor which should not be overlooked, but hardly one of primary importance except where the deficiency in the quantity of saliva secreted is very marked, approaching the condition cited above. The amount of saliva which a patient secretes during a dental operation is not necessarily a measure of the normal secreting capacity of that patient. A case similar to the above was reported by M. Rigolet in *l'Odontologie* for April 30, 1901.

Fermentable Carbohydrates in Solution in the Saliva as a Cause of

Caries. Fermentable carbohydrates are undoubtedly to be found in the saliva after every meal unless the teeth be very thoroughly cleansed immediately after eating or before making the test. Anyone may convince himself of this fact by the following simple experiment. Eat a piece of bread, allowing as much as possible to remain sticking to the teeth. About an hour later eject 5 c.c. of saliva and filter. The filtrate if kept at the temperature of the body will be found to have taken on a pronounced acid reaction in from twelve to fifteen hours, proving that carbohydrates must have been in the saliva in a state of solution. Aside from this, however, it has been pointed out, especially by Salomon, Michaels, Kirk, and others, that the saliva in certain cases contains a substance which responds to Von Jaksch's test for glycogen, although this test does not allow us to differentiate with certainty between glycogen, a product of food metabolism poured into the mouth by the salivary glands, and erythrodextrin, a product of food digestion in the mouth itself. To settle this question it would be necessary to test the saliva directly as it comes from the glands.

On this question Kirk (DIGEST, August, 1903, p. 968) writes as follows: "The presence of glycogen in the saliva at times is highly probable, though in the absence of a more characteristic test for that compound in the presence of erythrodextrin its presence in the mixed saliva cannot be taken as finally demonstrated. It would doubtless be possible to determine the question with sufficient accuracy by an examination of the saliva taken directly from the glands and before any contact with carbohydrate food debris in the mouth cavity was possible. That I have not as yet done, owing to the necessity for special arrangements for that line of work which I am not at present ready to take up. Certain physical characteristics of the saliva—its opalescence, for example—suggest in some cases the presence of glycogen, a suggestion further intensified by the chemical test referred to; and the strong probability that the predisposition to dental caries is correlated with and dependent upon a diathetic state makes it appear not at all unlikely that some fermentable carbohydrate substance, such as glycogen, the product of food metabolism, is constantly dialyzed from the blood plasma into the mouth through the medium of the glandular apparatus of the buccal cavity in cases of marked susceptibility to dental caries."

If the saliva as it flows from the ducts contained enough glycogen

to appreciably affect the course of caries by undergoing an acid fermentation in the mouth, then it would be a simple matter to establish its presence experimentally. The person whose saliva is to be examined would need only to rinse his mouth very thoroughly and then eject some 5-10 c.c. of saliva, which should be filtered and placed in the incubator. If glycogen be present in any quantity which could affect the course of dental caries the saliva will show an acid reaction in a few hours.

Out of eighteen cases where there was a pronounced tendency to caries the saliva treated as just described showed in six cases an alkaline reaction, in four cases a neutral reaction, in one case it was amphoteric with tendency to alkaline, in two amphoteric with tendency to acid, in three neutral to weak acid, in one neutral to alkaline, and in one acid, the acidity corresponding to about two units. The strongest acid reaction of about four units was obtained in a case of advanced diabetes where we might naturally expect sugar. Next to this was a case nearly free from caries but showing moderately active erosion, the saliva producing about three units of acid, being neutral at the beginning.

I conclude from the above results that there is no fermentable carbohydrate naturally present in the saliva under normal conditions in sufficient quantity to materially influence the origin and progress of caries.

Self-Cleansing Factor in Immunity to Decay. Different dentures show very marked differences in regard to the efficiency of cleansing processes, whether spontaneous or artificial. In some the crowns of the teeth are so well formed and arranged and knuckle up together so perfectly that as long as the interdental papillæ are in a healthy condition there is little possibility for food to lodge. In others we find the food sticking between the teeth everywhere. There can be no doubt that this circumstance is of very considerable consequence in regard to the origin and progress of caries. All places where food habitually lodges and can be only imperfectly removed are most liable to decay. For example, when a bicuspid stands inside of the arch so as to form a triangular space with the neighboring teeth all three teeth are sooner or later doomed to decay. Likewise when the gums recede in old age and the spaces between the teeth easily become packed with food we find extensive caries (senile caries) occurring in dentures which for fifty or sixty years may have been

practically immune. All the cases of immunity to caries which I have examined during the last few months have related to dentures where there was very little tendency to retention of food particles.

The comparative immunity of the lower front teeth to caries is due in a great measure to the fact that the food particles do not readily lodge about them, or if they do, as is often the case in advanced age when the gums recede and the teeth loosen, then these teeth appear to decay about as readily as any others. Both the physical and the chemical character of the food also demand consideration, but of these I shall speak later.

Comparative Susceptibility of Different Teeth to Caries. There is a widespread belief that the structure and chemical composition of the teeth have a marked influence upon their liability to caries, and so-called soft teeth, poorly developed and imperfectly calcified teeth, teeth of inferior grade, etc., have very generally been looked upon as doomed to decay sooner or later. This belief was first attacked by Black in his memorable researches on the physical characteristics of the hard structures of the teeth. He arrived at the following conclusion (*Cosmos*, 1895, p. 417): "Examinations of the density of the percentage of lime salts, and of the strength of the teeth, that are certainly reasonably accurate and include a sufficient number upon which to base trustworthy judgment, have shown that neither the density, nor the percentage of lime salts, nor the strength, is in any degree a factor in predisposing the teeth to caries, or in hindering its inception or progress."

No one has ventured to doubt the general accuracy of the experimental results obtained by Black. In fact, we know that the amount of calcium salts in different teeth is subject to comparatively slight oscillations. Many practitioners, however, basing their beliefs upon practical experience and observation, have been loath to give up the idea that different grades of teeth are liable to be attacked by caries in varying degrees.

From a scientific point of view, moreover, the following questions which I brought up in my "Microorganisms of the Human Mouth," 1890, p. 150, have not received the attention which they merit; "What is the relation of the lime salts to the glue-giving basis-substance? Are they precipitated in the cartilage according to physical laws, or are they held together by means of the organic substance, or do they enter into a chemical union with it? This is a

matter of importance for the understanding of certain pathological phenomena exhibited by the teeth. As emphasized above, the variations in the amount of salts in the dentin are by no means great enough to explain the variations in hardness. But in the case of chemical union between the organic and inorganic constituents of the tooth we should expect to find dentin hard or soft according as the union is stable or unstable."

The rate at which any calcareous body is acted upon by acids does not depend solely upon the percentage of calcium salts which it contains, but upon the stability of the compounds formed by those salts. A piece of tartar may contain more lime salts than an equal sized piece of dentin, and yet it will be much more readily decalcified than the latter. Unfortunately our knowledge of the nature of the combinations occurring in teeth and bone is very incomplete, nor does it at present appear just how we are to approach this question experimentally.

I have already pointed out ("Microorganisms," 1890, p. 196) that when teeth or fragments of teeth are subjected to the action of fermenting substance (bread and saliva) they are not all affected to the same extent. Similar observations were reported by Bogue, Jr., in the *Review*, 1901, p. 184. It seemed to me, however, that these experiments ought to be carried out with a greater degree of accuracy in order to decide the question definitely as to whether enamel and dentin from different teeth, or from different parts of the same teeth, are really acted upon in varying degrees by the same agents or not, so the following experiments were made:

Experiment I. Six-sided blocks of ivory, both of the hard (transparent) and soft (opaque) varieties, as well as of dentin of the walrus and sperm-whale, were suspended in a fermenting solution of sugar in saliva. In the course of six weeks it was found that the differences in the degree of softening were very pronounced. The ivory was decalcified to the greatest depth, the dentin of walrus somewhat less, and that of the sperm-whale to scarcely one-third the extent.

Experiment II. Plates of different kinds of dentin 0.9 mm. thick were suspended in a solution of sugar in equal parts of saliva and bouillon, kept for the first few days in the incubator. The time was carefully noted when these plates had become sufficiently decalcified

to permit their being pierced by the point of a needle. The results were as follows:

Soft ivory	65 hours.
Hard "	96 "
Pulp-stones from pathological ivory	120 "
Walrus	130 "
Sperm-whale	336 "

The resistance which the dentin of sperm-whale offered to the action of the acid was most pronounced.

Experiment III. Sections of soft and hard ivory and of dentin from the tooth of a sperm-whale were suspended as in experiment II, 1½ per cent of lactic acid being added to the mixture. The soft ivory could be pierced with a needle in 24 hours, the hard ivory in 48 hours, and the sperm-whale dentin in 192 hours.

Experiment IV. Same as experiment II, with results similar, but the difference in time not so marked.

Experiment V. Same as experiment II, with the following results:

Soft ivory	48 hours.
Hard "	120 "
Walrus	192 "
Sperm-whale	312 "
Human dentin	408 "

Determinations of the specific gravity of the different dentins under examination gave the following results. The specimens were taken from different teeth for the determinations A and B:

	A	B	
Soft ivory	1.76	1.72	sp. gr.
Hard "	1.84	1.83	" "
Walrus	1.92	1.92	" "
Sperm-whale	2.08	2.08	" "

It was a matter of some surprise and at the same time gratification when the results of the two determinations turned out to be almost, and in the case of walrus and whale absolutely, identical. On turning to the *Cosmos,* 1890, p. 348, I found the following results:

Ivory (soft)	1.76	sp. gr.
" (hard)	1.84	" "
Dentin (milk tooth)	1.88	" "
" (soft)	2.021	" "
" (hard)	2.073	" "

I was again agreeably surprised to find that the results I obtained at that time for soft and hard ivory were identically the same as those found in the determination A.

A chemical analysis of soft and hard ivory and of dentin of sperm-whale made by Dr. Carl Virchow gave—

	Water.	Ashes.	Ashes after restoring CO_2.
Soft ivory	10.5	54.8	54.8
Hard "	10.3	56.9	56.9
Walrus	8.7	60.4	62.1
Whale	7.4	66.7	67.3

Calculating the percentages for the dried substance, we have—

	Ashes.	Organic substance.
Soft ivory	61.2	38.8
Hard "	63.4	36.6
Walrus	66.8	33.2
Whale	72.7	27.3

The figures for ivory agree with those which I published in this journal for 1890, p. 348. It is particularly noteworthy that in case of the ivory no increase of weight was produced by treating the ashes with ammonium carbonate in the usual manner. This would seem to indicate that ivory contains little or no calcium carbonate. I am inclined to think, however, that we have here to do with a slight error of experiment.

Aside from this, however, we see here such a marked difference between the dentin of the whale tooth and ivory, both in point of density (specific gravity) and percentage of calcium salts, that we have at least a partial explanation for the very great difference in the rapidity with which acids act upon these two dentins. Between the soft and hard ivory the difference is much less pronounced and hardly sufficient to account for the fact that the one becomes decalcified so much sooner than the other.

At all events these results compel the conclusion that there is a very great difference in the resistance which dentin from the teeth of different animals offers to the action of acids. We cannot of course be perfectly sure that this difference is due to the difference in density and percentage of calcium salts, since we have no means of discovering whether the calcium salts, for instance in case of the dentin of the whale tooth, do not form a more stable compound with the organic matrix than they do in ivory. We must accordingly be satisfied for the present with having established the fact that there is a great difference in the rapidity with which different dentins are softened by acids and that this difference bears a certain relation

to the density of the dentin and to the percentage of calcium salts which it contains.

These results do not, however, justify the conclusion that the dentin from different human teeth must likewise show similar differences in regard to its susceptibility to the action of weak acids. Whether this be the case or not can be determined by experiment alone, and I hope to be able to present a contribution to the study of this question in a later issue of this journal.—*Cosmos.*

NUTRITION, RICKETS AND DENTAL DEFECTS. By J. Kingston Barton, M.R.C.P., M.R.C.S. (London). Two years ago I was anxious to prove by experiments that the rickety condition induced in children by improper feeding in infancy, and especially the imperfect permanent teeth of those fed by hand, might be imitated in the rearing of very young calves, so I made arrangements with a dairy farmer to feed some calves on fixed lines to imitate feeding in the human nursery. The first chosen was a male calf fed entirely on its mother's milk, drawn off and then given direct. At the end of thirteen weeks this calf was sold to the butcher. On being killed specimens of rib and breast bone joints and knee (which corresponds to the wrist joint) were preserved. These joints were selected as being those in which the affection called rickets becomes most easily manifest. In passing it may be mentioned that this calf, being so fat and well nourished, obtained so good a price that the cost of the experiment was much reduced. A calf (male) was then selected and fed on separated (fresh) milk with a patent calf food much used by farmers, but no cod oil was used. This calf got an acute stoppage, and died when about six weeks old, but was recognized not to be thriving before its fatal illness. Another calf (male) was started on the same lines, and this calf managed to exist in a very thin state till killed, also aged thirteen weeks. Similar joints were preserved from this animal as from that of the first experiment. Since making my few experiments I have seen the reports of a large series of similar experiments made by the Board of Agriculture in Ireland. Of course, the object of the Board was to find out the most economical way of rearing calves satisfactorily.

In making sections of the bones and joints I did not find the changes that might have been expected in early rickets, but a very marked difference was seen in the amount of internal fat and the

amount of blood distributed to the growing parts of the bones. No doubt the calves examined by me were much too young when killed to show well-marked signs of rickets, and in any case the quick growth to adolescence in the cow prevents the actual disease of rickets being produced. Also, natural feeding (the eating of herbage) begins so soon after three months from birth that this would prevent actual rickets ensuing. However, my two extreme cases agree with the results achieved by the Irish Board.

The great mortality of human infants owing to a scour bacillus developed in dirty milk in summer-time is due to the feeble resistance of hand-fed and patent-food-fed infants to all acute diseases. So that after the state has reduced infant mortality by insisting on a pure public milk supply, there will still be a large mortality left to be reduced by teaching the public to avoid all patent foods for infants. One of the chief objects of my experiments was to find out why hand-fed infants have such bad permanent teeth, but I soon found that unless animals were fed as in my second and third experiments as long as possible, and then kept till they were fully grown (four years old), there would be no means of seeing whether the teeth had been injured by the bad feeding at the early stage of life. If any dental or medical practitioners interested in this are aware of any really poor farmers who rear their calves on separated milk with calf meal, and who keep such beasts (female most likely) as future dairy cows, I should much like observations made on the lower front teeth, especially with regard to the absence of enamel, particularly in horizontal lines, as so often seen in the human subject. It would not be necessary to kill the animals. The Irish Board very kindly did their best to help me, but as all their calves were sold before the animals were quite two years old the teeth were not sufficiently advanced for observation.

The great French physician Magitot, in his work on the diseases of teeth in animals, figures a case of the lower front teeth with loss of enamel in a Durham ox. I searched the Museum of the Royal Veterinary College for a similar specimen, but without success; but I am sure the great increase in use of patent foods with separated milk will supply more examples of defects in the permanent teeth of cows if carefully looked for in animals over three years of age. Fortunately it will not be of the same importance in cows as it is in the human race.—*British Dental Journal.*

SOME DIFFICULTIES OF PLATE RETENTION. By S. H. Guilford, D. D. S., Ph. D. The construction of a full upper denture in certain difficult cases, so that it shall remain firmly in place both in speech and mastication, has ever been one of the trials that have taxed the general practitioner more than almost any other. To make plates for so-called *easy* mouths that will serve their purpose well is so simple a matter that dental parlors and advertisers thrive by their making. These favorable cases, which all of us meet with less frequently than we desire, are those in which the jaws, both vault and ridge, are of normal form and outline, and the bony substructure is evenly covered with membrane of a moderately elastic nature. In such cases the plate, of whatever material constructed, rests equally upon all the parts covered, and presents a somewhat uniform resistance to the force of mastication. Under such conditions it is not liable to be dislodged, whether it be held in place by atmospheric pressure or simple mucous adhesion. In all other cases, however, the problem of retention is one which calls for the exercise of great judgment and much skill and experience.

These difficult cases are naturally divided into four general classes: One, where the vault is abnormal in form, resembling a Gothic arch, with possibly a deep fissure along the median line. Another, where the normal line of the vault is interrupted by a hard, bony protuberance in the center. Still another, where the vault is flat and shallow and the alveolar ridge almost entirely resorbed. The fourth, where the roof, though normal in general outline, is dense and unyielding in some portions (usually the center), and extremely soft and flabby in others.

To overcome the difficulty in the first variety, where no central vacuum chamber is available or serviceable, it has been recommended to form two small individual vacuum chambers, one on either side of the center, where the tissues are unbroken in outline and more or less elastic in character. While no apparent scientific reason exists why such a procedure should not result favorably, it nas been found to be entirely unsuccessful in the practice of the writer.

There are two ways by which the difficulty may be successfully met: First, by forming a vacuum chamber so as to include all the fissured portion of the vault; or, second, where this is not feasible, to make the plate conform to every portion of the vault, and by

slight scraping of the plaster model on the buccal portion of the alveolar ridge in the bicuspid and molar region, cause the plate to hug and bind sufficiently to hold it in place. This latter plan has proven successful in certain cases where all other means of retention have failed.

For the second difficulty, where there is a central bony protuberance, only one way of relief has been found. It consists in so constructing the plate that it shall not come in contact with the prominence, but rest evenly upon all other portions of the arch. In vulcanite plates this is easily accomplished by placing two or three thicknesses of No. 60 tin foil on the model over the enlargement just previous to packing the rubber. The use of tin foil insures a polished surface to the vulcanite in contact with it, which is more sightly than that produced by scraping the plate at this point after vulcanization. In metal plates a corresponding relief may be gained by covering the prominence on the model with a piece of thin sheet-wax, thus forming a slight vacuum chamber.

In the third variety, where the arch is flat, owing to the absence of the alveolar ridge, little difficulty may be experienced in causing the plate to adhere to the tissues if they be of uniform density, but it will probably be inclined to shift its position in mastication. The best way to meet the requirement in these cases is either to make no vacuum cavity and depend upon close adaptation to keep it in place, or to make a very large and shallow one, covering almost the entire vault from ridge to ridge. A large suction chamber will usually yield the best results, as the resistance to the force of dislodgment is distributed over so large a surface.

In the fourth class the difficulty to be overcome is undoubtedly greater and more commonly met with than in any of the others. The general method of procedure in these cases is to take a plaster impression and then examine the mouth carefully to note where the hard and soft places are located. This done, either the impression is scraped at points corresponding to the hard portions of the palate and ridge, or the model is scraped where the soft portions are found. In experienced and skilful hands this method generally produces good results, but it is an unscientific and haphazard plan of procedure, for one may easily scrape too much or too little, and in either case failure will result. For many years the writer has made it a rule never to scrape or in anywise alter the face of an

impression or model after he has obtained one to his satisfaction.

If relief for hard portions of the palate or ridge be needed it can be obtained by placing pieces of tin foil over such portions on the model, if for vulcanite work, or by placing similar pieces on the die previous to swaging, if for metal work. This leaves the model and die free from permanent mutilation, which is often very desirable.

A far more scientific and successful way is to take the impression in such a manner that the soft parts are compressed as much as may be desirable, for whether we compress the soft parts or elevate the hard ones the result is the same, viz., a uniform pressure of the plate on all portions.

The writer's plan is to place pieces of moderately softened beeswax on the impression tray at points corresponding to the soft portions of the ridge or palate and take a rude impression with them. After removing and chilling, mixed plaster is placed in the tray in the usual manner (covering the pieces of wax as well) and a second impression taken. When the tray is introduced it is pressed up firmly into position so that the hardened wax (covered with plaster) will compress the soft tissues. When removed we will have an entire plaster impression, perfect in all its details, but representing the soft portions of the mouth compressed as they would be under a plate bearing uniformly on all parts. A plate, either metal or vulcanite, made from an impression thus taken will be found not to rock or tilt in mastication, but to resist the usual pressure without dislodgment.

We so often meet with cases where the anterior portion of the bony ridge has been considerably resorbed, leaving the soft tissues covering it soft, flabby, and yielding, while the other portions of the arch are normal in character. An impression taken entirely in plaster will represent the parts in repose, soft as well as hard, and a plate made upon it will almost certainly yield and tilt in the act of biting, owing to the yielding character of the tissues in front; but when these are compressed in the act of taking the impression, as described, we secure a model representing the tissues under compression, and as they have yielded to their full extent while taking the impression they cannot yield further when the completed plate rests upon them. A trial of this method will convince any one of its value and efficiency.—*Stomatologist.*

GOLD CAP CROWN WITH UNIFORM CUSP REINFORCEMENT. By H. B. Harrell, D.D.S., Gainesville, Texas. I notice in *Items,* November, 1902, "A Rapid Method of Making Shell Crowns," by Dr. F. B. Olwin. In the December issue, Dr. Goslee calls attention to the fact that in the January number he had presented, considered and illustrated the same method. On referring to the January article I find that he had partly described a method that I have been following for about ten years; but he says that the same detail of procedure is applicable to the formation of cusps without the use of models or articulators. The results, however, while perhaps occasionally as artistic, are not so accurate, because no guide for obtaining the correct length of cusps is present, and no opportunity is afforded for proving the articulation and occlusion in the final adjustment and attachment of the cusps to the band, unless it be done directly in the mouth. This is where my method differs from Dr. Goslee's and I think obviates the difficulties which he mentions. This is the part I particularly wish to describe, but it will be more intelligible to give the method in full.

Solder band with 22 karat solder; fit band to root, leaving band as high as possible, sometimes cutting a notch or scallop in the top of the band to make room for an opposing cusp or to give desired shape to the crown. With pliers form the sides of band to desired shape. Place the band on the root, warm a small piece of impression compound and pack it in the open end of the band; then have the patient close his jaws, and if there is a long opposing cusp that shuts deep into the compound, have the patient grind his jaws. This is to prevent the crown from interfering in chewing. Chill the compound and remove the band with compound in position. Dry the inside of band and compound, melt a little hard wax and pour in the crown, being careful not to drop in enough at a time to soften compound so as to change its shape. This unites the band and compound and acts as a guide in cutting the grooves in carving. If desired you can now mount on an articulator for an occluding model, but we will proceed without articulator. Trim off compound and carve grinding surface. Always trim compound so as to expose the edge of band as much as the thickness of plate from which you expect to swage your cusps (Fig. 1). (I use 24 karat plate rolled almost as thin as possible for forming cusps.) This exposed edge of band forms a small shoulder which acts as a stop when placing on your

swaged cusps; it also forms the cap so that when the crown is finished there is no line of solder to be seen, the joint being so perfect, whereas if the shoulder had not been left the finishing would cut through the cap and leave exposed the solder that is used to reinforce the crown.

With your carving finished, mix a little plaster (thin) and spread it on a paper tablet; dab some in the fissures on the grinding surface of crown to prevent air bubbles; then press the grinding surface of the crown into the surface of plaster to just above the edge of band. As soon as the plaster is set, remove the crown from the plaster and trim the face of plaster down to within about one thirty-second of an inch of the shoulder in the impression made by the edge of band. If this leaves a level surface, place the small end of an old iron sewing thimble around the impression and pour it full of fusible metal, just as it is beginning to become mushy. If the edge of band has been notched or scalloped, so as to cause an uneven surface around the

Fig. 1.

Fig. 2.

impression, use a ring of moldine instead of the thimble. Drive this die into a piece of lead for a counter die. Cut a piece of thin 24 karat gold plate and stamp your cusps; this makes a cap. (Fig. 2 a.) Place your cap in position on crown over the carved compound, trim off the flaring edge, leaving just enough to burnish over and around the edge of band (Fig. 2 b), and your cap is like a well fitting box lid and can be put on only in its correct position and the shoulder stops it at the correct place. Remove the cap and dip it into nitric acid to remove lead, etc. Anneal the cap and replace it on the crown; reburnish so as to make the adaptation more perfect; remove the cap, warm the band over a flame, push out the wax and compound, burn off the adhering wax and dip the hot band into sulphuric acid; wash off acid and replace cap. You will find it will go on only in the right position and stop at the right place.

If you are making a single crown you can solder the cap and band well together with 20 karat solder and use a lower karat solder for reinforcing the grinding surface, but if you are to use it in a bridge, reinforce with 20 karat solder and you can reinforce and solder band

and cap together at the same time. To reinforce, and have your grinding surface of uniform thickness and strength, and to confine your solder where you need it, that is, to have it reinforced over the high points as well as in the depressions, and not have it climb the sides of the band, take a piece of thin 24 karat gold plate or platinum (or perhaps platinoid would answer) and punch it full of holes. Have the punch cut out the pieces from the plate and have the holes large enough that the solder will not fill them until all the space under it is filled. From a small piece of this perforated plate stamp or press a cap. (Fig. 2 c.) (You can usually press it enough for practical purposes and avoid having the cap hang in the counter which the holes would cause it to do if stamped). Trim this perforated cap so that it will drop into the crown and lay nicely in the bottom.

This makes your grinding surface double with a uniform space between; fill this space with 20 karat solder if it is for a bridge, or a lower karat if you like; for single crowns remove the overlap of the cap and solder from the top of band; when filed and polished this leaves the line of union between cap and band so fine that it cannot be detected. I have never found it necessary to touch one of these crowns with a stone to give occlusion. This method is the result of assembling ideas gathered from journals and from experience in an effort to produce my ideal of a cap crown.—*Items.*

NERVE LESIONS: THEIR ETIOLOGY FROM A DENTAL STANDPOINT. By W. H. Metcalf, D.D.S., New Haven, Conn. Read before the Connecticut State Dental Association, 1903. In presenting to you so broad a subject it is incumbent upon me to explain that, owing to the time limit of such a paper, it must necessarily be treated synthetically and not strictly from the point of view of the scientist, be he anatomist, physiologist, or pathologist.

The investigation of the collateral sciences and their many and varied ramifications best serves the student through the medium of his own particular specialty, therefore it seems to be our mission as dentists to dissect this subject principally along the lines of dental experience. Perhaps no profession offers better facilities than ours for such investigation; in fact, I might truthfully say that, working as we do upon subjects who are comparatively healthy as well as upon those who are diseased, and coming into such close contact or association with the nerves of sense and feeling, we have thrust

upon us most exceptional opportunities for scientific as well as artistic research. The proof of this is manifest when we reflect upon the rapid advancement of dentistry as a scientific profession, and upon the many improvements in its methods of practice.

To get a more intelligent conception of nerve lesions, and to more accurately trace their intricacies and complexities, we should first look for a moment into the apparent nature of normal nerve structure or force, beginning our pilgrimage at the cell. The normal tissues of the body are made up, as it were, of cells, or groups of cells, each tissue having its characteristic group. Nerve cells respond to stimuli through the afferent system. These stimuli all act as irritants, and are classed in our physiologies as mechanical, chemical, thermal, and electrical; the latest theories including also a force or influence emanating from the will.

These cells hold "stored energy," and are so constructed or organized that they will readily respond normally to stimuli. When stimulus is more than normal the vital force of the cell is exhausted, and the converted energy fails to react. On the other hand, when stimulus is less than normal, as in the case of a structural defect interfering with physiological action, the result is invariably a lowering of the stored or potential energy of certain groups of cells, directly connected and sometimes in a reflex way with the lesion. In other words, the power of resistance of a cell depends upon its structural relations with its fellows, any defect of continuity, of course, lessening its power of storing vital force and giving off its converted kinetic energy. Yet this same kinetic or resultant energy, if normal, may be or is an occult force in nature, which supplies new energy through waste, perhaps as the earth gathers momentum in its endless journey through space, or as the wheat germ will spring into life and growth after a dormant existence in some sarcophagus for a thousand years. Briefly, to give metabolism the attributes of perpetual activity and life negatives the essence and meaning of both its name and functions. That is, if we agree that anabolism means the building up of the body elements, and katabolism the breaking down of certain elements during the changes preliminary and incident to assimilation and nutrition, then, as death ends the process, we are compelled to admit the cessation of an outside dependent energy, which seems to prove the supposition. Granted, then, that the vital essence or principle comes from outside the cell, it goes

without saying that the cell is formed for the reception of that force, and not the force for the cell. It would surely sound better to say that man was made to receive the Divine love and wisdom than to reverse the proposition. The cell, then, being made to receive and operate this outside energy, it follows that it must be of normal size and shape and in perfect working harmony with its surroundings; when it is not we speak of the condition as disease or abnormal anatomy, and if you will pardon the term, perverted physiology.

Nerve lesions, then, are pathological, and their etiology embraces two causes, which may be classed as internal and external. As dentists the external causes concern us most, for of the nature and working of internal causes advanced medical science has as yet shown us but little that is of use. Insanitation is perhaps the best word to express the nature of outside causes of nerve atony. This includes uncleanliness, and admits the presence of the much dreaded microorganisms. Malnutrition is, I presume, the most appropriate term to express the internal causes. We have, then, in the cursory scanning of the field, noted that when the causes of nerve lesions are from within metabolism should be promoted, and a condition of perfect nutrition should if possible be established; if from without, then the most modern prophylactic, disinfectant, and antiseptic measures of sanitary science should be adopted.

It occurs to me at this point that I may possibly be misunderstood when making the statement that nerve lesions are the result of perverted physiology or disarranged anatomy, for this would imply accident, and this is of course not always the case. Disease not always but generally involves a question of individual responsibility. The human body is a personal trust, and when function is abused disease finds easy entrance. To avoid disease then, or nerve lesions, we must look not only for abnormal anatomy but for functional disorder as well, for it is the latter which most frequently brings about disease. Each human body needs an engineer with a well-balanced judgment to run it properly. Many errors of the past treatment of disease or of lesions may be laid, I think, to the non-belief in this personal responsibility theory—namely, that every man is the arbiter of his own physiological and functional economy. The dentist should be a doctor in the full meaning of that term—a teacher and a counselor. In other words, he should endeavor to show his patients that disease is not an entity, but the absence of health; that the human machine is

made to respond to intelligent management with normal functional activity, and that abnormal functional activity exhausts and deforms the organ.

Then again, while the individual is practically the architect of his own destiny, he nevertheless is but an atom in the great sea of humanity, and must necessarily be to a great extent influenced by the condition of the whole. It therefore behooves us, in exercising the personal care and responsibility for health, to also do our best to educate our patients and the masses into the correct ways of thinking about themselves, and their wonderful privileges and possibilities.

But I can seem to hear some of you say, How about the practical side of this question of nerve lesions, that side which concerns us as artisans and mechanics? How about the nerve lesions in and about the teeth? After all this *is* the question which concerns us the most, touches us the nearest. Many of you have been practitioners much longer than I, and without doubt have noticed and noted more; but after about twenty years of dentistry I have come to the conclusion that the many disturbances connected with tooth-structure and their etiology may be summed up as almost invariably coming from one cause, viz., early neglect, or, in other words, that the teeth of children have not been scientifically cared for. Beginning at the cradle, with proper food, correct environment, and hygienic care, the deciduous teeth should be saved if possible until the eruption of the permanent teeth, thus making nerve lesions and abnormalities much less likely to occur. It seems to me that the coming study for both dentists and physicians is physiological chemistry; not that which has direct reference to drug effect, or therapeutics in the medical sense, but the true animal chemistry of the body itself, as it demonstrates itself through normal and abnormal glandular action, cell proliferation, assimilation, nutrition, and metabolism.

One of the many causes of malnutrition of the second or permanent teeth is, I think, the premature extraction of the first teeth. Think for a moment of the delicate adjustment, arrangement, and *modus operandi* of nature in the cutting or eruption of the permanent teeth! Think how volcanic, how traumatic, how iconoclastic, the brutal extraction of the baby teeth must be! How it must suddenly arrest the nutritive activity of normal anabolism! How it must tax the

recuperative powers of the surrounding parts, at the expense of the new or permanent teeth in their marvelously delicate processes of formation, nutrition, and growth! Think of the numerous complex abnormalities which possibly may be traced either directly or indirectly to this cause: directly as in dental malformations and irregularities, and indirectly as in the high arch, deflected septum, and possibly hypertrophied tonsils, adenoid growths, and the many resultant and sometimes serious deteriorations of the branches of the fifth pair and their reflex influences.

When we properly understand the subtle chemistry of body metabolism, as it relates to the restoration and repair of nerve lesions, and their consequent structural defects; when we more fully comprehend the marvelous and insidious workings of cell action and reaction, as influenced by the more marvelous circulatory or fluid supply; when we begin to get intelligent glimmerings of the true or inmost nature of the various stimuli; or, to be brief, when we can treat diseases by the same means, or means of the same character as those which produced them—then we may truly call ourselves physicians and dentists. The past history of both medicine and dentistry shows much that is noble, progressive, humanitarian, and undeniably true; but alas, after all is said, how little we really know about the real workings of animal physiology, and as dentists, how little about the real nature of dentition! In view of these facts and surmises, is not the proper care of and attention to children's teeth one of the most important problems before the dental profession to-day, with a view to the ultimate improvement of the race?—*Cosmos.*

FEVER OF DENTITION. It may be of interest to the dental practitioner to learn the views of a medical brother concerning the cause and proper treatment of so-called disorders of dentition, and in consequence we quote an article by E. R. Corson, *New York Medical Journal:* It will sometimes be found profitable to take up a homely subject and go over it again. What we have become indifferent to from familiarity may absorb us again when looked at from another standpoint, and this new point of view may be forced upon us by some incident in our practice which has shown us that we are still far from the whole truth.

I have had such an experience in the treatment of dentition, and though warned by one mistake which should have been sufficient, I

committed it again with more disastrous results. Several years ago I lanced two infants' gums with bad, and even fatal, results, and I have not lanced a child's gums since. A large seven months' boy baby was brought to my office with a high fever and the swollen gums of beginning dentition. The pulse was rapid, the child restless and nervous; the gums over the lower incisors were red and swollen. The bowels were reported normal. Ascribing the trouble directly to the teeth, the gums were lanced, and the child immediately went off into violent convulsions (this was at 10 o'clock a. m.) and they were controlled only at 4 p. m.

About a year later I was called to see an infant, a boy aged fifteen months, with a high fever, and a history of pertussis of three weeks' duration. There were loud mucous rales over the entire chest. I could make out no pneumonia. There was slight constipation. The child was very restless and nervous. The gums were much swollen, the first molars and upper and lower cuspids almost through. I placed the child's head in my lap and lanced the gums freely above and below, and had hardly done so when the child became suddenly rigid and cyanosed, and stopped breathing. Hot baths and long-continued artificial respiration failed to restore the child, and I had to make what explanation I could to a despairing mother.

I reported these two cases in a paper entitled, What Are the Indications for the Gum Lancet? I have since heard of two similar cases, a death from lancing the gums in a children's clinic in New York, and a case of convulsions following lancing of the gums in our own city.

As to the cause of death in this case, I could ascribe it only to a spasm of the glottis and shock in a very sick child, susceptible to the slightest irritation. The other patient was probably on the verge of convulsions and needed only a slight irritation to start them. Now, the mistake I made was in regarding the swollen gums as the chief source of the trouble, the relief of which would speedily cure the patient, when in fact other troubles of a much more serious nature demanded attention entirely independent of the teeth, or only indirectly connected with dentition. This same mistake, I think, is often made to-day. It is the disorders occurring during dentition which require our attention, while the mouth, but for a mouth wash perhaps, can take care of itself.

A survey of the literature will show that the eruption of the teeth,

whether it occurs early or late, is only indirectly the cause of the so-called disorders of dentition. And these disorders may be ascribed directly to reflex troubles, or to deleterious influences upon a system rendered unusually susceptible at a period of great physiological activity. As to the fever itself, so frequent during infancy between the sixth month and two years, I do not find much written in a definite way, although I have not by any means exhausted the literature on the subject. As I have some views of my own, I shall state them as briefly as possible.

So far as the mouth alone is concerned, a large majority of the cases of dentition, no matter how swollen or how painful the gums may be, are simply cases of physiological congestion of the parts involved. The cases where this congestion passes into a real inflammation are rare, and the cases where this inflammation passes on to suppuration are rarer still. So that in a large majority of the cases there is nothing local in the mouth to cause fever, and if fever exists we should look elsewhere for the cause. Uncomplicated cases of dentition the physician does not see. It is only when fever exists that his services are in demand; but the mother naturally looks to the mouth as the seat of the trouble, and the physician, unless he stops and considers, also looks to the mouth. But the case now ceases to be one of dentition, becoming one of something else occurring during dentition, and far removed from the mouth. How often do we not see cases of aphthous or ulcerative stomatitis without fever, and where this condition exists alone there is no fever. Physiological congestions, wherever they may be, rarely or never cause fever. The physiological congestion of the breasts in beginning lactation, long supposed to cause fever, is now known to have no influence on the temperature above the subfebrile, and whatever fever may be present can be traced to sepsis or other causes. The same may be said of the menstrual molimen, however painful it may be, or however numerous the reflex symptoms, provided there is no intestinal sepsis.

We are thus naturally justified in looking elsewhere for the fever of dentition than in the local condition in the mouth. Now the commonest disturbance associated with this process is a gastric or intestinal or gastrointestinal one. This will show itself by constipation or diarrhea, by nausea, vomiting, anorexia, and various pains, stomachal or intestinal, and, most important of all, by fever. The

reasons why we are justified in ascribing the fever to the intestinal trouble are several: First, we meet with the same fever, accompanied by the same gastrointestinal symptoms before and after dentition, and by the same vasomotor and circulatory disturbances, and find them promptly relieved by the same remedies. Again, we know now that a stomachal or duodenal stasis, any interruption in the digestive process and more particularly of that in the duodenum, which is the most important digestive center, permits the absorption of half-digested or half-oxidized products, certain albumoses and toxines, which produce fever just as readily as bacterial products in infected wounds. In fact, it is recognized that under congestive and inflammatory conditions in the alimentary canal these same bacterial products are absorbed. Fever is frequently produced in adults by this cause, and how much more liable is the susceptible infant to the same cause, and especially during the period of dentition. Again, as we should expect, we meet this complication in those infants of poor constitution where the digestive functions are below normal. Again, how often have we not seen the rapid decline of a high fever immediately after vomiting or the passing by stool of the offending matter in the bowel, and found that those remedies which encourage the removal of this half-digested matter are the best febrifuges. The so-called teething rashes are the direct result of this intestinal trouble.

You may ascribe this disorder to a direct reflex source, to a chilling of the surface, to imperfect food, to almost any cause you wish, operating during the susceptible period of great physiological activity, the period of growth and development, and still you will have ever before you the upper bowel principally as the seat of the trouble. Of course bronchitis or pneumonia, or any other chest condition existing at the time, tells its own story, and you have another or an additional cause for your fever; but these are the exceptional conditions and are more remote from the dentition proper. Therefore, as we can indicate the duodenum or the most vital portion of the alimentary canal in the digestive process, as more important than the stomach or the bowel below, as the point where the nervous and circulatory energies are most active, and therefore from a reflex or from any other cause, most apt to be affected, we may well call the fever of dentition a *duodenal fever.*

I am sure that when we are out of sorts and talk about our liver,

we had better first mention the duodenum as the primary trouble. For it is duodenum and small bowel and portal circulation before the liver wakes up to the situation. And our so-called liver remedies are really duodenal remedies. That is what calomel is.

If all this is admitted the treatment is very evident. First, it naturally follows that any interference with the gums is of very secondary importance, if not absolutely harmful; and that whatever local treatment may be used in the mouth, the lancet will be but rarely called for. The literature on the subject bears me out here. Secondly, and most important, a treatment directed to the disturbed digestion is the one thing needful. Further we have no long list of drugs to consider. I think we can all agree that a few calomel triturates and castor oil cover a multitude of sins; and that if we prescribe aconite and bromid or chloral, it is only until those old standbys shall have time to act.

There is, however, one remedy that I should like to say a good word for, and that is potassium chlorate, an old friend much neglected, I fear, in these days of so many drugs. In my experience this agent is more valuable internally than locally, yet I use it both ways. It is potent for good in many diseased conditions of the mucous membrane of the mouth, caused by dentition or in any other manner, especially if the way is cleared for it by peroxid of hydrogen. I use it internally for other mucous membranes. Lawson Tait taught me its value in controlling pelvic congestion, and my prescription of a combination of potassium chlorate and tincture of hydrastis canadensis I use indifferently to control menorrhagia or metrorrhagia and to cure a stomatitis, aphthous, mercurial, or ulcerative. It has, besides, a good influence upon the mucous membrane of the entire alimentary canal. But as I said before, look to the duodenum and relieve the trouble there with a few simple remedies, and you will need no fever mixtures.

PROPHYLAXIS: EXTENSION *FOR* PREVENTION, OR EXTENSION *OF* PREVENTION? By Lyman Curtis Bryan, D. D. S., F. B. D. C., Basel, Switzerland. Read before the New York Institute of Stomatology, May 5, 1903. The undoubted increase from generation to generation of the ravages of decay in the human teeth leads us to pause in our methodical ways of treating and filling teeth, even though we have made the most approved methods

of modern dentistry our own, and ask ourselves if we are doing the best of which we are capable for our patients and getting the best possible results.

It will be conceded that it is the usual thing for the dentist and patients to meet each other annually or semiannually and to find, almost to a mathematical certainty, that there are a number of cavities that require filling. In a practice where patients are well trained—among intelligent people—they have been led to expect this and to think that it is unavoidable. The best patients do not wait until they experience pain—they come regularly for examination, and expect the dentist will find cavities and fill them before the pain occurs. They know that cavities left until then are more painful to fill, require longer time to treat, and cost them much more to repair, with greater danger of giving trouble afterwards. They find it economy in time, money, and pain to go to the dentist often, as often as he thinks fit, and will come exactly at the time recommended. A patient who does so, and who brushes his teeth from one to three times a day, has a perfectly clear conscience as regards his teeth, and thinks he is doing his whole duty.

If the dentist fills the cavities present and lectures the patient on more cleanliness or the use of silk between the teeth, proper brushes, and an antiseptic wash, and then shines up the front teeth with a brush-wheel and removes the calculus from the first molars above and the six incisors below, he too has a clear conscience as to that particular patient. He finds even these first-class patients begin to have recession of the gums later in life, slight discharges of pus may occur about the necks of certain teeth, the gums may become slightly festooned or swollen, or the teeth may get loose in their sockets. Then he tells the patient that he has pyorrhea alveolaris, probably inherited from his parents, or it may be the result of overwork or overworry, or, lastly, of sanitary conditions. We do not think for a moment that it has been our fault, neither does the patient think it is his fault; we all take it as an indication of increasing years and the result of our environment or of predisposing causes. We could have prevented it. We see cavities, some below or about perfect gold or amalgam fillings; we fill these and advise stronger brushing and other prophylactic treatment by the patient, which he probably thinks is superfluous ad-

vice, as he brushes his teeth three times a day and does not think he can possibly devote more time to it.

The next time he comes we have an approximal cavity, say, on the distal surface of a molar, to fill for this patient. We then enlarge the cavity to cover a space which extends to the line reached by the brush, by cutting away with a chisel all frail walls and extending our cavity as Professor Black has (and as Professors Wetherbee and Coolidge) advised, in my college days, beyond the point of danger. This is "extension for prevention." This does protect that particular surface of that particular tooth from further decay, but there are at least five other surfaces subject to decay on that molar. The patient may think we are cutting away from a good tooth to make a large cavity, especially if we use some force with our chisel and break off pieces of enamel which appear to him to be strong. Some ignorant people imagine the dentist makes cavities to fill them, or makes existing ones larger to get a larger fee; but we know we have done our duty; we know "Extension for Prevention" is the watchword of the day and is approved by the best men in the profession, so we feel that we are doing the best we can for the patients. We have made a large contour filling that we know will remain a monument to our skill for many years, and we stretch ourselves up in pride and pat ourselves on our lame back and say to ourselves, "Well done, dear old fellow!" Dr. Blank never made as fine a filling as that, and we think we have done the best we could for our patient. But lo! next year there is a cavity on the mesial surface of that tooth and three or four other cavities in the mouth requiring the same laborious, painstaking, and painsmaking care to extend and prevent future trouble in each particular case, and so it goes on from year to year, and the dentist's work is never done.

We have come to consider this the working of natural laws. We have probably thought that we should devote more time to prophylaxis, more scraping and polishing, removing of slightly affected spots on the teeth, flooding them afterwards with a forty per cent solution of nitrate of silver and polishing away the discoloration again, painting discolored surfaces of teeth with iodin and polishing them bright with pumice and wheels, soaking nitrate solution in around margins of fillings where decay is liable to occur and between teeth which lie closely together and present rough surfaces

where the silk passes through, trimming up margins of fillings which irritate the gums and hold decay-producing debris. However, after we have had the patient several sittings to make our great operations and do what he recognizes must be done, he is glad to get out of our hands, and we have not the heart to say to him, "Much of this work which we have lately done could have been avoided by doing a number of little things for prevention. It is possible for you and me to keep your teeth in such a state of cleanliness and antisepsis that much of this decay would not occur. If I could now spend an hour or two more for you in doing little things which we class under the heading of prophylaxis, your mouth would be in a much better condition to resist decay and next year we would not have so much to do." No; we see he is tired of it all and glad to get away. We may have scraped tartar off in a hurry and wounded his gums, and made the necks of his teeth so sensitive that he will remember us for a week with regret; we know his bill will be large anyway, and perhaps he would pay less willingly the five or ten dollars under the heading "various operations," or "cleansing the teeth," after all the other items, which he finds large enough as it is, and he will not understand why he should pay us as much per hour for "fussing around and killing time" as for making a gold filling, which he knows he had to have made to save the tooth and prevent toothache.

But a trumpet voice has sounded in Philadelphia that is reverberating through America in unmistakable tones and echoing around the world, making for many of us an uncomfortable spot in our moral anatomy where our conscience is supposed to lie—Dr. Smith and his apostles tell us we are not doing our duty by our patients. This band of reformers of dental practice tells us we have no right to let people go on in ignorance of prophylactic treatment, or of what can be done to prevent decay; of what their duty is to their teeth and what our duty is to them. We are told we can prevent decay in many places, and that we should do it. We should see our patients oftener and make fewer large operations, do them also when necessary, but in time bring the tooth up to a higher plane of vitality; attend to the little things like those mentioned above which experience has taught us will prevent decay in certain places. We should spend twice the time and care in treating and cleansing the teeth.

We should use nitrate after drying the teeth, so that it will penetrate and stimulate the tooth to resist decay. We should use iodin to discolor the injurious films and loosen them up about the teeth where decay comes; this we should polish off with pumice powder until the teeth are clean on every surface above and below the gums that we can reach with hand wood-points, engine-points, thin tape, and silk thread covered with powder between the teeth. Places already softened and decalcified should not be pointed out to the patient with the remark, "Next year you will have a cavity there," or "Come in six months to have this place filled." We should remove the decalcified surface, dry it, paint it with nitrate of silver, and afterwards remove the discoloration with iodin tincture (producing probably ioduret of silver, which is yellowish-white). We should cleanse with delicate scalers—Younger's and other fine, smooth-pointed ones—the neck and under the gum of each tooth, hunting for those little commencements of pockets about the necks and use in them our caustics and stimulants, and not simply tell a patient that in five years he will have pus-discharging pockets and loose teeth.

Our first duty should be to thoroughly cleanse the teeth before starting to fill or do other work. As demonstrator in charge at the Boston Dental College I never allowed a student to commence filling teeth for a patient until he had thoroughly cleansed the teeth. This the boys considered a great hardship, and shirked as much as they could, and judging from most new patients I see the general run of dentists avoid this as much as my students used to. Many dentists who spend a half-hour doing this, at most an hour, will assure you that they do it most thoroughly, but a specialist in pyorrhea will spend hours before he has made thoroughly clean a mouth with calculus on the roots.

We should gradually induce our regular patients to come often for extension of prevention, and we shall have less extension for prevention. We shall have to practice both, but the time will come when one can point with pride to the glistening, knuckling molars and bicuspids, with their surfaces as nature made them, as we point now to the glistening and golden monuments of our misguided efforts and neglected duty to our patients. This is an ideal future, and will not be for us, who have done our half or quarter century work, to see its full fruition. Its perfect results will be seen only

by the younger men of the profession. It will have to be done by commencing with the young—the very young, and we cannot expect to see results save after a few years, but I feel a solemn faith in the future of extension of prevention, or prophylaxis, in its various branches. If we use all the known methods ourselves, and use them often, seeing patients much oftener than we have done, and some as often as Dr. Smith recommends for his hand, wood, and pumice treatment, "once a month," and others every three months when the teeth are weak and decay often occurs and recurs, we shall more certainly be doing our duty by our patients, and there will come a time—which Dr. Smith tells us he has already reached—when decay will be the exception and the teeth will be strengthened and protected, not simply repaired and patched.

The oftener we see our patients and interest them in their teeth the more personal care they will take of them. We are told that in a short time teeth so treated will take on an entirely different nature of enamel and dentin; that the tooth is stimulated by rubbing with wood and pumice powder just as the muscles are by massage; that the process of building and repair which goes on in the tooth from the pulp will be stimulated inside, to resist decay from outside. We know that nitrate of silver not only kills the germs on the surface and makes the tooth immune for a time, but it has the stimulating power of an irritant, and causes the pulp in the tooth to throw out a protecting wall of dentin of very dense structure which resists decay. We further know that nature carries out this same process to a certain extent in every cavity of decay, but under present conditions decay overcomes this process of repair and goes on in spite of it. We know that the tooth is almost certain not to decay when it is kept perfectly and constantly clean or treated with nitrate of silver. We know that teeth decay only on the surfaces which it seems impossible to keep clean and which are not kept clean. We know that the teeth which look clean have invisible coatings of deleterious and injurious germ cultures, and now we know that it is our duty to remove these often and thoroughly. Do we do it? We should do it. If we cannot do it as often as it should be done, we should use the nitrate of silver solution everywhere each time we see the patient. No fear need be felt of discoloring even front teeth. Enamel which is not disintegrated will not take on the dark color from it. If it does, then

we have a danger signal there; the coming trouble is located; we can remove the discoloration with iodin, and any traces of iodin or its combination with nitrate; with ammonia; with iodin painted on the silver stain, and ammonia to wash or scrub off the iodin. Nitrate stains, when fresh, can be removed from the fingers also, and dark remnants are rubbed off with a block of pumice-stone or Sapolio. Rubber gloves used by surgeons may be used to protect the hands. I have families of children with frail teeth which I bathe, from incisors to molars, in nitrate of silver forty per cent as often as I can see them, and I am having splendid results with them and no serious discoloration. It is only latterly that I have extended this treatment to the incisors. I have been using it in increasing quantities and more frequently for several years since Dr. Stebbins recommended it so fully.

I had a family in which the mother's teeth had just melted away, and she and her sisters had almost all the teeth back of the cuspids crowned or bridged. As the younger generation came on I began the use of nitrate on the temporary and permanent molars, and with a little girl, who is now ten years old, I had succeeded so well in saving these molars and other teeth that I was congratulating myself I had stopped decay in them. Recently I happened to think it was time to begin to clean the lower incisors, which were all erupted. What was my horror to find them all decayed, six cavities, large ones, in the four new little incisors! Such a case of early decay I had never seen before. I had noticed signs of decay in upper permanent incisors, and had bathed them freely in nitrate and had kept them from decay approximately, but had never seen the lower incisors decayed at that age. One can think of the beneficial effects of nitrate, by its saving all the other teeth, while these little unsuspected teeth, that almost never decay until all others are filled and crowned, had become damaged under my very eyes.

I have often thought, since Dr. Rosenthal of Brussels suggested the abonnement system (Dr. Smith had used it in certain cases), that we should have a system of abonnement for children, for in this way we could get our little patients to come often—could demand their frequent visits, and their parents would not think we were doing unnecessary work or seeing them too often. As it is, with our fee system, many of us would hesitate to demand

the attendance of our patients who have frail teeth as often as it is necessary, for fear they should think we had little to do and wished to make capital out of them. I believe it would be a good system to propose to a certain class of regular patients to take a general average of their work for the last few years, agree to treat their teeth for less or for an equal annual sum, and then have them come as often as we feel we could benefit them and as often as was necessary to thoroughly apply our prophylactic treatment. The first year our time would not be so fully paid, but from the second year the results would be a decided gain for both parties, for we could prevent decay in less time than we could repair and remedy it, and the patient would be saved much pain and have infinitely better teeth and general health, besides less display of gold and other fillings. Unquestionably pyorrhea would be less frequent and troublesome, and we should see the advantages of extension of prevention over extension for prevention.

Dental friends to whom I have proposed this plan object that the great advantages of this preventive treatment would not be appreciated by patients, and they would not pay for it as readily as for filling cavities which came in teeth, as has been our custom, and that it is not our duty to prevent cavities and reduce our work and income. There are others, however, who look at the subject from a higher plane, and will be more conscientious in treating patients who confide their teeth to them and expect them to do their best to save same, to save them pain, to strengthen weak teeth, to prevent the loss of teeth in later life through Riggs' disease, or pyorrhea, to prevent the loss of pulps and resulting abscesses, etc.

We are told and believe that prophylaxis secures almost total immunity from decay, great improvement in color and general appearance of the teeth, diminished sensitiveness of the dentin, the tightening of many teeth which have become loose, relief from undue sensitiveness of the gums, their marked adhesion to the necks of the teeth, the beautiful color and striation appearing in them, cleanliness and general comfort of the mouth, and universal improvement in the character of the breath. These are all matters attracting notice, inspiring confidence, and awakening most lively interest.

Dr. Smith, in his able articles on his special treatment by hand with wood-points and coarse pumice-stone powder applied once a

month in certain cases, says, "Recognition will yet be made of the important fact that to the presence of foreign matter on and about the teeth, rather than to the quantity of it, the beginnings of decay and pyorrhea are wholly attributable. The deleterious influence of a breath perpetually laden with offensive emanations from this source, especially during seasons of salivary inactivity, as in sleep, will ere long be disclosed as an important factor in many pulmonary and digestive disorders, and will be taken account of in medical diagnosis and treatment."—*International.*

REMOVING PULPS FROM TEETH AND THE SUBSEQUENT TREATMENT—WITH REFERENCE TO PRESERVING THE NATURAL COLOR. By J. P. Buckley, Ph. G., D. D. S., Chicago. Read before the Northern Indiana Dental Society, September 16, 1903. In the removal of pulps from teeth and the subsequent treatment there is at least one very important factor to be considered other than those of asepsis and the thorough filling of the root canals, and that is the preservation of the natural color. This applies of course to the treatment of those teeth the crowns of which we intend to save by filling, and especially is it desirable to obtain this end since the advent and more general use of porcelain and gold inlays, for by these means the crowns of many teeth are saved which were formerly sacrificed and replaced by artificial ones.

Every conscientious dentist is often confronted by conditions of the dental pulp wherein it is difficult to decide which would be the best course to pursue—to try and save the pulp or to remove it and properly fill the root canals. How often, when judgment dictates the latter method, and you suggest to the patient that the pulp had better be removed, have you been asked the question: "Why doctor, doesn't a tooth always darken after the pulp has been removed?" You think of your past experience and perhaps are forced to answer, "Well, yes, they usually do," and then, contrary to your best judgment you attempt to cap the pulp, if exposed; or if not exposed, some of the decalcified dentin, saturated with the poisonous by-products of bacteria, is permitted to remain, and sterilizing it as best you can you put in a base of cement and fill the cavity, only to find in a year or perhaps less that the pulp has been unable to resist the baneful influence of these ptomains, and that it has died, decom-

posed and caused the crown to darken—the very thing which you tried so hard to avoid.

Like every practitioner who has been in active practice for a few years I have had this experience, and as a result I have finally come to the conclusion that it would be better to adopt some method of treating pulpless teeth by which the color would be preserved, than to obtain the former result for a few months only by attempting to save this organ. Now, I do not wish to give the impression that I favor the indiscriminate destruction of pulps—far from it, but I do desire to say that with our knowledge of pathology, bacteriology, therapeutics and antiseptic surgery, and with our favorable experience with root-canal filling materials, we should no longer hesitate to remove the pulps from teeth when their vitality would be jeopardized by the possible presence of bacteria or their alkaloidal ptomains, or by the close proximity of the filling material itself.

I can conceive of only one condition where we are justified in capping the pulp, and that is in the mouth of a young patient where we suspect the root has not been fully developed. In such a case it is our plain duty to attempt to preserve this organ if only for a year; but the operation and its object should be explained to the parent or guardian, with the instruction that the patient must return at once in case of subsequent trouble. In older patients I do not think it good practice to try to save the pulp where the caries has penetrated deeply, especially if the tooth has ached for any length of time.

Many patients have been made to suffer unnecessarily because large metallic fillings were inserted in too close proximity to the pulp, and many conscientious dentists have performed these operations, as previously mentioned, simply because their experience taught them that the removal of the pulp invariably caused discoloration. Now why should a tooth change in color because the pulp has been removed? Is this physical property dependent upon the vitality and life of the pulp tissue? Surely not. The color of the tooth depends upon the array of colors in the dentin, which are reflected through the nearly colorless and transparent enamel. All will admit that occasionally you have been fortunate enough to remove a pulp and retain the normal color of the tooth. It was this fact that led me to investigate the usual methods of treating

pulpless teeth, and to conclude that if a tooth discolors after the pulp has been removed and the canals filled there has been carelessness on the part of the operator in performing the operation.

That we may ascertain the possible cause of this discoloration, let us review briefly the general methods of devitalizing and the subsequent treatment of these cases. It will be well to keep in mind the pathology of this pulp tissue which has become a source of trouble to the individual. Usually caries has been progressing until the microorganisms or their poisonous by-products have produced irritation. To irritate a tissue or organ means to stimulate, and over-stimulation of a part soon produces hyperemia, followed by certain textural changes characteristic of inflammation. I would have you remember then that in these pulps to be removed there is an abnormal amount of blood, an excess of vital action, or greatly increased functional activities. In most cases this disturbance of the pulp tissue has caused at least a hyperemic condition of the tissue surrounding the apical end of these roots.

Generally an attempt is made to allay the pain for at least twenty-four hours, when some preparation of arsenious acid is applied and allowed to remain from two to four days. The arsenical treatment is then removed and the pulp-chamber opened, which usually produces slight hemorrhage. The cavity is now flooded with dialysed iron; then, without any special care being taken to remove all traces of the dialysed iron, or blood which contains this metal, tannic acid in some form is sealed in the cavity for the purpose of constricting the tissue. After a week or ten days this dressing is removed, and it will be noticed that the pulp tissue is dark in appearance. You also notice—would you observe carefully—that the dentin reflects colors through the enamel several shades darker than the adjacent teeth. This method of treating teeth is, in my judgment, faulty. I believe more teeth have been hopelessly discolored in this manner than from any other one cause. Many discolored teeth can be successfully bleached; but those discolored from tannic acid and iron are almost impossible to bleach satisfactorily, because they are stained by iron tannate, one of the most insoluble and, therefore in this case, indestructible substances known to chemistry. Tannic acid is one of our best remedial agents, but like many other valuable drugs, it has often been used where it should not have been.

Perhaps some of you will say that you have long since discarded

this method of devitalizing and are using the later methods of removing pulps by pressure anesthesia, yet these teeth usually darken. I welcome pressure anesthesia and am glad to know that it is gradually superseding the older method; but there are certain cases where, for want of time or because of inaccessible cavities, etc., we deem it best to apply arsenic. When this method is followed tannic acid should *not* be used and every trace of the dialysed iron, if used at all, should be removed with alcohol *before attempting the removal of the pulp.*

To those of you who take pride in removing pulps and preserving the color of the teeth I would suggest that no better method can be adopted for the treatment of molars and many bicuspids than that recently presented to the profession by Dr. A. W. Harlan of Chicago, where he advocates digesting the pulp tissue after devitalization by means of a vegetable ferment, papain, which is obtained from the bark of the unripe fruit of the pawpaw tree. Dr. Harlan describes his method as follows. "The pulp must be devitalized by the use of a corrosive acid or poison. In adults I leave the arsenical paste in the tooth from forty-eight to ninety-six hours. When the dressing is removed I cut away the bulbous portion of the pulp and wash it with peroxid of hydrogen. I then dry the pulp chamber and slightly moisten it with dilute hydrochloric acid 1:300. The cavity is then packed with a papain paste composed of:

"Papain, gr. V.
"Price's pure glycerin, minims IV.
"1-200 acid hydrochloric, minims V.

"I place a layer of paper fiber soaked in liquid vaselin over this and seal the cavity with oxyphosphate of zinc or oxysulphate of zinc. This is left for a period of two weeks in single-rooted teeth, or three weeks in others where there are two or more roots. When the tooth is opened the pulp will be found to be wholly digested into a jelly-like mass, or it will be so altered or reduced in size that its remains can be washed from the canals with pyrozone or peroxid of hydrogen with little or no difficulty.

"Time is the important factor in pulp digestion. When you remember the trouble and pain that the removal of dead pulps has caused your patient in the past you will welcome a method so certain and sure in its results. I know that there are many pulps which can be removed from the roots easily by the use of local anesthetics,

or by the pressure method of anesthesia, and there are many others easy to remove with broaches, but there are also many in bicuspids and molars and even in other teeth where it is not easy to remove them without pain and the expenditure of much time. These are the cases where this method is applicable."

Dr. Harlan's method, I fear, will never become very popular because of the time required to digest the pulp tissue, but I can say for it, besides being valuable in disposing of the tissue in fine and tortuous canals, that by employing it the color of the teeth can be preserved. A feature of it to be welcomed is that it obviates breaking broaches in these canals, which is often a source of much trouble as well as the cause of discoloration. I prefer, however, using sodium dioxid where the doctor advocates hydrogen dioxid. The former chemical converts the jelly-like mass into a soluble soap which is easily washed out with warm water, thereby mechanically removing any insoluble compounds that may have been formed by the oxidation and saponification of the remains of the digested pulp. In lower teeth the dry powder can be placed directly in the pulp chamber in contact with the jelly-like mass, and with a platinum broach can be carefully worked down into the root-canal. It is presumed, of course, that the rubber dam is adjusted and all teeth included securely ligated. In upper teeth where it is difficult to place a powder in a cavity I make a paste of the sodium dioxid with absolute alcohol, in which it is insoluble, and this can be handled more easily and safely. Having the paste in the cavity, the alcohol is evaporated with hot air, when the subsequent procedure is the same in either an upper or lower tooth. I use sodium dioxid in preference to the oxidizing solutions, as stated, because of the saponifying action of this chemical when properly decomposed. To get this action distilled water must be used to decompose the powder in the cavity. This I proceed to do. The water rapidly decomposes the powder, liberating oxygen and giving as a by-product sodium hydroxid. The oxygen disorganizes and the sodium hydroxid saponifies the fatty contents of the canals. This should be thoroughly removed and followed by the application of some weak solution of an acid (2% H_2SO_4), when by using alcohol the canals can be thoroughly dried and filled. In favorable cases I have frequently digested the entire pulp tissue at once by the use of sodium dioxid. In the use of any digester, however, the precaution must always be

taken to have the tissue *thoroughly devitalized* before applying the agent, as it is not a pleasant experience for the patient to have *live* tissue digested. No one who understands the chemical properties of sodium dioxid will attempt to use this chemical without taking every precaution to prevent its coming in contact with the soft tissue about the mouth, and no one is justified in using it without a knowledge of its chemical properties, for while it is a valuable agent and has many dental applications it is not one to be used by careless operators.

Those of you who are using pressure anesthesia and are still having trouble with the discoloration problem, I would ask, are you careful in the selection of the remedial agents and materials with which you control the hemorrhage, sterilize, dry, and fill the canals of these teeth? That you may know all dentists do not exercise judgment in this regard, permit me to refer to two published methods of performing this operation. From *Items*, June, 1903, I quote the following from an article by Dr. W. Clyde Davis: "Apply the dam if possible and dry the cavity. If pulp is not exposed, but covered with a layer of softened dentin, apply first a drop of adrenalin, then one drop of a 40 per cent solution of formaldehyde. If some distance from the pulp use slight but continued pressure with a rubber plug for a few seconds. You can now excavate to complete or near exposure painlessly. You are now where we all usually make an application of arsenic for devitalization and are ready to begin with the operation. Apply to the cavity one drop of adrenalin, taking some up in the operating pliers. Lay in the cavity a few crystals of cocain or a small one-sixth grain soluble tablet. Apply one drop as above of a 40 per cent solution formaldehyde. Apply pressure with a rubber plug, at first very lightly but steadily, with not enough pressure to cause the patient any pain, gradually increasing the pressure until at the end of 40 or 60 seconds you are kneading the rubber into the cavity with burnishers with all permissible force, none of which should cause your patient any pain. Now remove covering to the pulp chamber and pass broach slowly toward the apex. If there is a tendency to much hemorrhage, or patient should feel in the slightest degree any movement of the broach, repeat the method again, being sure not to omit the formaldehyde. At the close of this you can remove the pulp of any tooth without the patient feeling the operation, and in cases where the tooth is

slightly sore to percussion, as in advanced stages of pulpitis, the soreness will have disappeared, as many times I find that the peridental membrane has lost its tactile sense. In case of a large apical foramen, where you are bothered with hemorrhage, again apply the adrenalin only with pressure for fifteen seconds, and not another drop of blood will be discharged. Those who will may proceed with root filling. I prefer to dress the root with a non-irritating dressing (campho-phenique) for twenty-four hours and then fill. The advantages of the above are: First, it is painless; second, it saves time; third, the color of tooth is never changed; fourth, the after-soreness is slight and many times wanting; fifth, your application is a powerful antiseptic."

Dr. Davis is extremely careful in his use of formalin and must be, if he verifies in practice his fourth advantage claimed for this method, viz., "the after-soreness is slight and many times wanting." But I venture to say that the doctor's assertion " that the color is never changed" is correct. Dr. D. E. McConnell in *Hints,* July, 1903, after describing and endorsing this method, says: "Occasionally there will be considerable hemorrhage. When this happens, first wash out the canal with peroxid of hydrogen, which removes the blood and also some of the irritant formaldehyde; then, either with a cotton-wrapped broach, or by means of a rubber plug, force some adrenalin chlorid to the apex. This will control the bleeding, when you can cleanse with peroxid again, dry, and fill the canal."

Here is a method by two men, supposedly the same, one preserving the color of the tooth and the other invariably failing in this respect. Now, why this difference in results? Both use the same agents in the same manner, except the latter gentleman in case of hemorrhage first uses hydrogen dioxid, which he claims "removes the blood." He should have said, which decomposes the blood within the tooth structure, forming an insoluble compound which, if not mechanically removed, is liable to produce subsequent discoloration.

The color of the blood is dependent upon the hemoglobin, each molecule of which contains iron feebly combined. When the nascent oxygen of the hydrogen dioxid solution comes in contact with the unstable molecule of hemoglobin this substance is decomposed and ferric oxid is produced, the very compound which for some years I have contended was the cause of the discoloration of teeth from

putrescent pulps. I know that the per cent of iron in the hemoglobin is small, but it is generally conceded by the best authorities that this metal chemically combined with certain other elements constitutes the chief factor in the discoloration of teeth, from the decomposition of the pulp tissue. The only difference here is in the formation of the compound. In the decomposition of blood by nascent oxygen ferric oxid is produced directly, while to produce this compound, theoretically, from the decomposition of the pulp, would involve a long process of chemical reasoning—an explanation of which has been attempted by me in articles previously published and need not be here repeated.

We should never be hasty in controlling the hemorrhage after removing pulps by pressure anesthesia; for the escape of blood from the hyperemic tissue about the apical ends of the roots is one of the best means of readjusting this tissue to its normal condition, and will also lessen the liability of causing peridental disturbances by the filling of the root-canal. If it is necessary to use a remedial agent to control this hemorrhage we should select such an agent as adrenalin chlorid, which has an astringent or constrictive action upon the tissue, and then remove the blood from the canal as blood, and not use an agent which simply decomposes this fluid within the tooth structure, and which can have no hemostatic action upon the tissue whatever. In this instance the agent is decomposed in the canal and does not reach the tissue upon which it is expected to act.

In conclusion, I desire to emphasize the fact that we as a profession, now a recognized specialty of medicine, must ever strive to increase our knowledge of pharmacology—a science which treats of the action of drugs upon the tissues, organs and functions of the body.—*American.*

SWAGING ALUMINUM BETWEEN PLASTER DIES IN VULCANIZER FLASK. By Dr. Stewart J. Spence, Chattanooga, Tenn. For the past month or two the writer has been experimenting very satisfactorily with a method of swaging aluminum which he believes has some advantages over the usual method of swaging between zinc and lead. It consists in bringing the plate to shape between a die and counter-die of plaster, poured respectively into the upper and lower sections of a common vulcanizing flask.

The reader may possibly remember that in the *Cosmos* for July of the present year, in an article entitled "The Behavior of Plaster of

Paris," the writer mentioned a method of swaging aluminum between a hard-setting plaster and shot in the Parker swaging device. It was there stated that though this could be successfully done the process was open to the objection that the heavy blows necessary to drive the shot would crack the die vertically. I make this digression to remark that later experiments showed that this objection could be overcome by making the base of the die perfectly flat—by placing it while crystallizing upon a piece of plate glass—so that, resting on the flat floor of the swaging device, it is so supported at all parts of its base as to be unlikely to crack vertically. There yet remains, however, the objection that very heavy hammering, and the use of the pliers toward the last, are needed to swage the plate to the die along buccal and labial surfaces where anything of a depression exists, because shot will not flow around and press with sufficient force upon these surfaces. While thus experimenting the following more simple and effective method was generated in the writer's mind —largely through the able suggestions of his next-door neighbor, Dr. S. B. Cook.

The lower section of a vulcanite flask (one without separable bottom, and small in proportion to the upper section) was filled with Spence's plaster, and at the same time plaster from the same mix was poured into the impression and then inverted and pressed down on the plaster in the flask, so that the two became united to form a die or model. Care was taken that the impression was not pressed down below the edge of the flask, as this would have resulted in an elevation of the corresponding portion of the counter-die above the edge of its section of flask, and of its thus being left unsupported by the flask wall at a point where such support is specially needed in swaging, to prevent its flaking off under the pressure.

When setting had occurred and the tray and impression had been removed, the next operation consisted in providing for a space between die and counter-die along the buccal and labial surfaces, to make room here for the plate. (This provision is unnecessary in swaging with metal dies, because it is made during the swaging by the compression of the lead counter-die. This, however, is more true with the thin and comparatively hard 18-k. gold plate than with aluminum, which being softer and thicker is to some extent stretched and squeezed out between the two metal dies, this constituting an objection to their use.)

This required space was obtained by fitting a strip of base-plate wax, about six inches long and a half inch wide, to the entire labial and buccal surface. It is not essential that this wax be exactly the same thickness as the plate, because, if the space made by it between the dies be a little smaller than the plate, the counter-die, being of a softer plaster, will yield sufficiently; and if it be a little larger, that is easily remedied by inserting in the resulting space a strip of rubber, in the way hereafter described. With this strip of wax *in situ* its upper edge, that is, the one nearer the ridge, is brought to a bevel by a hot spatula being drawn over it; the melted wax flowing to the median line of the ridge. No wax is used on the palatal surface. If an air-chamber be desired it is now provided for by affixing to this surface a piece of aluminum plate.

The die thus prepared is dressed with soapstone and the counter-die is made by filling the upper section of the flask with Spence's plaster, so mixed as to set somewhat softer than the die. This plaster can be worked to set with from one to eight times the hardness of plaster of Paris, and in these swagings the die was given a hardness of about eightfold and the counter-die about fourfold that of that material. (An easy and exact method of finding the relative compressibility of any two plasters, or plaster and metal, is this: Into the two sections of a vulcanizing flask pour respectively the two materials to be tested, then place between them some substance which has each side equally capacitated for penetrating, such as a steel ball, and screw down. Fill the depressions thus made with wax, which then roll into ropes of equal thickness. Their relative lengths will give the answer.) After crystallization the flask is opened, the wax removed, and swaging is performed by screwing together the sections of the flask.

As aluminum is more pliable than the 18-k. gold used in gold plate work it can be very nearly conformed to the dies by pliers, etc., before flask-closure begins. For the same reason the horn mallet is not needed; a piece of wood, such as the handle of a vulcanite scraper, applied by pressure answers the purpose better. This softness of aluminum, however, allows of its being easily marked by the pliers, which therefore should be muffled; that is, a soft substance, such as tin, is wrapped around one of the beaks—the one which is used on the inner side of the plate.

The plate having thus been brought by pliers, shears, etc., to suffi-

cient adaptation to the dies to allow of the bolts and nuts of the flask reaching each other, pressure is applied and the flask is partly closed. It is then opened, and the edge of the plate where too redundant is trimmed down, and then the pressure is reapplied. Of course the plate should be occasionally annealed, and the dentist should be aware that aluminum blisters before assuming redness. On nearing the close of the swaging some force is necessary to turn the nuts, and it is not wise to hold them too near the eye when thus under heavy strain.

As in the early swaging there is much pressure made on the margin of the counter-die, usually some compression of this margin results, so that after closure the operator may detect space between the edge of plate and counter-die where the latter has thus been compressed. Of course at such points the plate has not been driven against the die. To remedy this, and to bring the entire labial and buccal surfaces of the plate thoroughly up against the die, a strip of pink rubber, similar to the before-mentioned strip of wax, should be placed between the plate and counter-die along the buccal and labial surfaces, and the flask reclosed.

In some of my early swagings I was annoyed by an occasional slabbing off of small flakes from a protruding ridge. The cause of this breakage soon appeared: Where there is any overhanging of a protruding ridge, even though the accompanying depression be filled flush by the before-mentioned strip of wax, there will be insufficient space for this protruding ridge to pass the margin of the counter-die. They may even come in contact, with the result that one or other will be chipped. The case is aggravated when a plate goes between them. Prevention of this lies, first, in tilting upward the protruding ridge so that it will not overhang, and second, in adding to the strip of wax enough melted wax to cause all labial and buccal surfaces to assume a distinct outward slope downward from the ridge. In the final swaging the use of one or two pieces of pink rubber applied at the spaces which will result from this waxing will readily force the plate to the die at these points.

The writer has swaged two plates on one die, the first one being No. 16 gauge and the second No. 18, without any perceptible compression of the die or any breakage; and when it is remembered that No. 19 is thick enough for plates the certainty of this method is proved.

A plate swaged by this mode has none of the spring which frequently accompanies one swaged by malleting, but sits perfectly dead upon the die. This is because the blow of a hammer tends to curl a piece of sheet metal, while the slow steady pressure of the screw, for some reason, does not so do.

While the above method works successfully, the writer has tried a modification of it which may be briefly mentioned. It is this: Instead of applying only one thickness of base-plate wax to only the labial and buccal surfaces, he has used two thicknesses and covered the entire model. This results in a large space between the dies, into which the plate can be easily, though at first imperfectly, swaged. After this preliminary swaging a sheet of red rubber, with an extra strip along the buccal and labial surfaces, is placed in the counter-die, and the case is reswaged. This imprisoned rubber becomes temporarily very hard under the pressure, and so performs fairly well the part of a counter-die. But a very much greater pressure is required by this method than by the other to bring out the rugæ and suction chamber. Indeed, all the force I could apply with a flask press and the three bolts and nuts quite failed to give anything like a sharp margin to the chamber. However, a mere relief chamber can readily be obtained by this latter process, and this is to be preferred to an air-chamber when a plate has been swaged under conditions so favorable to adaptation as those here indicated—on a die absolutely without either expansion or contraction, taken direct from the impression, and not on a die composed of a contracting metal (zinc) taken from a sand mold made by an expanded plaster-of-Paris model derived from an expanded plaster-of-Paris impression.

The possibilities of flask swaging are not limited to aluminum. Doubtless platinum, and perhaps partial gold plates, could be similarly swaged successfully. Nor is the method limited to plaster for dies and counter-dies; Melotte's metal, tin, porcelain, etc., can be used. The writer has swaged gold dummy shells, both singly and in blocks, using porcelain teeth for the dies.—*Cosmos.*

IMMEDIATE ROOT FILLING. By Otto E. Inglis, D.D.S., Philadelphia. Read before the New Jersey State Dental Society, July, 1903. Immediate root filling I understand to mean the placing of a permanent root filling immediately after extirpation of a pulp prepared for removal by arsenic, pressure anesthesia, cataphoresis or

any analogous method, or immediately after opening up a root canal containing a gangrenous pulp, or remains of one, for the purpose of filling it. When a canal containing either sort of pulp is tentatively dressed with cotton after the extirpation, a later permanent filling cannot be considered as "immediate," though if tentative dressing be unavailing and canal or apical sepsis recur, and permanent filling then effects a cure, I should regard the latter procedure as an entirely new departure from the method previously employed and legitimately to be regarded as "immediate filling."

Again, the opening and sterilization of a root canal for purposes of abortion in cases of acute apical abscess do not bar a subsequent sterilization and filling from being called "immediate." It is quite possible to adopt a form of removable immediate permanent root filling which may be placed in prepared root canals with the intention of leaving it in place if no pathological condition supervenes, while yet it may be removed for further treatment if such condition arises. The placing of a permanent cavity filling or of a temporary one immediately after the root filling is placed has nothing whatever to do with the operation known as immediate root filling, although the first procedure may of course indicate greater confidence in the method employed.

Immediate root filling as thus defined is not a new thing, but as it is in many cases a good procedure and of vital interest to us all, I take up its consideration before you. At the October, 1902, meeting of the Philadelphia Academy of Stomatology Dr. James G. Palmer of New York pleaded for conservatism in root canal treatment and favored a tentative root treatment, particularly in septic cases, and was supported by Dr. Louis Jack and others. Dr. F. Milton Smith of New York, however, took strongly the opposite ground and claimed that thorough sterilization of septic root canals and apical tissues allowed him to fill permanently all septic root canals at the first sitting. He excepted one condition, that of a canal from which he could not exclude moisture which would persistently enter by way of the apical foramen. The discussion upon these points was exceedingly interesting and valuable and may be found in the *International Dental Journal* for March, 1903.

Experiments in Immediate Root Filling. My early education in root canal treatment, together with perhaps a certain degree of over-respect for my patients, inclined me to the use of the tentative

method, but after hearing the discussion referred to I resolved to conduct experiments of a clinical nature to determine for myself some of the points in connection with these cases. In the college clinic I gave instructions to students to fill roots permanently and immediately after extirpation of the pulp by cocain pressure anesthesia and after the use of arsenic, which method was then most commonly in use. There was almost absolute success when directions were followed, and such teeth as gave discomfort were found to have done so as the result of imperfect manipulation of the root filling. In a few cases the roots were found only partly filled, and proper filling produced the desired good results. For the most part in these cases cones rolled from temporary stopping were packed in sections into the canal which was moistened with eucalyptol.

The same results have been found in my own patients. In this class of cases I have used immediate filling for many years except where much apical irritation has resulted from broaching. In cases of aborted apical abscess the teeth were left open after venting and root-canal sterilization until such time as subsidence of the apical inflammation occurred. By this time the canals were again infected and resterilization had to be resorted to. In some of these cases the tentative method was used and in others immediate filling was ordered employed as for uncomplicated gangrenous pulp.

Method of Sterilizing Root Canals. In the cases of uncomplicated gangrenous pulp the teeth were sometimes treated with the rubber dam in place and sometimes without it, as for example in cases in which the dam could not be successfully employed to exclude saliva. In the latter cases the mouth was sterilized with a strong potassium permanganate solution. Next the teeth were opened with burs until access to canals was obtained. The cavity was flushed out, the patient requested to open the mouth, and the excess of moisture removed from the bulb of the pulp cavity. Previously a little sodium dioxid in powdered form was placed on a glass mixing slab and a drop of water was also placed on the slab near it. A fine broach was now drawn through the water, then through the sodium dioxid, and the adherent mass carried into the root canal and gently worked in for a short distance. The sodium dioxid reacted with the water and produced sodium hydrate and hydrogen dioxid which liberated nascent oxygen. When a portion of the canal was sterilized, a Moffatt syringe was held in the left hand, and while gently

broaching with the right hand a stream of water was passed in. The combined action freed the canal of remnants of pulp, etc., as far as the broach was inserted. The mouth was now again evacuated, the cavity again dried, and more sodium dioxid introduced and carried further in. If during the course of the sterilization saliva began to enter the cavity it was removed by a douching from the syringe and work again resumed. No attempt was made to prevent a deep action of the sodium dioxid, in fact, it was invited for the fine roots, yet not carried too far into the open foramen. If possible the foramen was explored with the broach. This work was continued for possibly ten minutes with a fairly open root; the other cases required a longer time, and if necessary drills and sulphuric acid were used to enlarge the root canals.

The mechanical work and sterilization completed, the mouth was napkined to exclude moisture; the roots were dried with cotton twist on tempered Swiss broaches, thoroughly dried with hot air and filled permanently, or if desired, tentatively dressed. The permanent fillings experimented with were chloro-percha on cotton twists, gutta-percha cones in sections, the canal being moistened with eucalyptol, temporary stopping cones used in the same manner, and in certain doubtful cases forma-percha on cotton. In careful hands good results were obtained, and in my own practice I have enjoyed the satisfaction of having no particular trouble with the method, any resulting irritation usually passing away promptly and only occasionally iodin counter-irritation being required.

Methods Compared. The comparison of the tentative and immediate methods in the same case deserves some notice. I will mention a few typical cases. In a lower bicuspid with gangrenous pulp I opened under rubber dam, sterilized and dressed with cotton and an antiseptic. After two days the patient reported a slight soreness. I dressed again; still there was some tenderness, and so on until I became disgusted. I then sterilized and filled the root permanently and applied iodin to the gum. After a slight soreness the tooth became comfortable and so remains.

An upper central incisor with a history of apical pericementitis was sterilized with sodium dioxid and dressed with cotton and an antiseptic. In a few days it was opened and a free flow of pus followed the removal of the cotton. I again sterilized for about fifteen minutes with sodium dioxid, forcing it well into the apical

space. After drying thoroughly I moistened the canal with eucalyptus and filled with sections of a cone of temporary stopping. Iodin was then applied to the gum. This case was absolutely comfortable from date of filling and was under observation for two months after filling. It did not form a fistula nor show any sign of pericemental irritation. In that class of cases in which effusions continually escape from the apical tissue into the canal, as is shown by the repeated moistening of the cotton swab, there is no doubt that from that point immediate work is of as great value as a tentative method. Deliquesced zinc chlorid in very small quantity on the end of the cotton swab will as a rule promptly check the effusion, when the canal may be dried and filled. I know that this use of zinc chlorid has been criticised, but I beg to report my own good results notwithstanding.

Immediate filling in cases of certain forms of apical abscess of semi-chronic or subacute nature seems good in my experience, but I am not prepared to advise its use in the violently acute cases. In cases of chronic abscess with fistula it is good practice, and at times seems to be the only method of effecting a cure, though to be sure there are cases of septic cementum that are beyond a cure by this method. Aristo-paraffin, aristol and wax, and paraform and wax are other forms of removable root fillings, and in the larger roots any of the forms of gutta-percha are readily removable by means of drills; cotton and chloro-percha are the most difficult of them to remove.

The time saved by immediate root filling is enormous, and in a full practice it is a great comfort not to be compelled to sandwich patients into one's engaged hours for the purpose of treating teeth. The patients will come out of the proper time in spite of every precaution, and the earning capacity of time is markedly lessened without a compensating remuneration for the treating. While no one would wilfully neglect the requirements of any case, or treat immediately when circumstances indicate another course, this is a point of no mean importance. As stated by one of my confreres across the club luncheon, "One does a lot of little things in treating which tax his ingenuity and take up his time and for which he does not get paid." He is a man who thinks well of himself and has a fine practice among well-to-do and discriminating patients, so that I think my ground is fairly well taken.—*Items.*

ROOTS AND THEIR TREATMENT. By Mr. S. J. Fernandez, Sydney, N. S. W., Australia. Such workers as Downie, Evans, and others have so improved crown and bridgework that nowadays roots in their treatment are becoming more and more important, and will continue to be so until the slow educating of the public as regards their teeth will disclose to them the necessity of visiting a dentist regularly, thereby saving themselves and the operators the unpleasant task of dealing with decayed roots. However, great strides have been made in overcoming the difficulties of what a few years ago would have been considered hopeless cases. In fact, as long as the diagnosis shows that the roots are not hopelessly abscessed, or show no signs of severe periodontitis, something may be done in most cases in a therapeutic direction. In this paper I will endeavor to present this subject in its latest forms and methods, drawn from various sources, with no pretensions of originality, but with the idea of presenting a revision for the benefit of students, who may find the variety of the articles written on the subject somewhat confusing.

Starting from this varied and much-discussed subject, we recognize the following three states, omitting abscess complications and periodontitis, which are dealt with under a separate heading: (1) Pulps which have been devitalized. (2) Pulps which are in a putrescent state and non-sensitive. (3) Pulps in which are found filaments still living and sensitive.

We will now consider—(1)*Pulps which have been devitalized.* (1) Apply the rubber dam. (2) Obtain free access to the pulp-cavity. (3) Dry, and apply an antiseptic, preferably a non-coagulant. (4) Remove as much as possible of the dead pulp, picking out the debris carefully without forcing any particles through the apex. (5) Dry, and apply an antiseptic. (6) Remove rest of pulp-filaments by a cleansing agent, e. g., sodium dioxid, etc. Fill, taking care that the root has been thoroughly dried and that a non-irritant and antiseptic filling material closes the apex, e. g., iodoform paste—formed thus: Eugenol or eucalyptus, zinc oxid, and iodoform. Aristol and cassia, carried on non-absorbent cotton wool, pressed up with a shaped wooden toothpick soaked in cassia (rendering it elastic), may be used to very good advantage.

In these cases almost any filling material may be used, except when discoloration is to be considered in anterior teeth, that is, when

the natural crown is to be preserved. In that case the use of liquified salol or gutta-percha is advised. If there should be only a root to be used for a crown or abutment the base should be thoroughly coated with silver nitrate. Should cement or gutta-percha be used to insert a pin or support a crown, in the first-mentioned case plug the apex with iodoform and eucalyptus, and in the latter case with iodoform and eugenol, being careful that the plug in both cases is as minute as possible, and that it gets to its destination.

(2) *Pulps which are in a Putrescent State and Non-Sensitive.* Diagnostic. An application of pyrozone three per cent, which will by a bubbling process indicate the presence of pus. A putrescent pulp remaining in the root-canal gives rise to the formation of sulphureted and phosphoreted hydrogen gas from the disintegrating tissue, which, when the septic matter is forced through the apex, causes irritation and subsequent abscess of the surrounding tissue. The presence of these suppurative gases warns us to be very careful to destroy them before closing the pulp cavity, and in destroying we must on no account force them through the apex. After adjusting the rubber dam our object will be to free them, taking a small particle of sodium dioxid or a minute globule of sulfuric acid on a platinum point or a platinum drop-tube. Apply carefully, making two or three applications in preference to causing a violent explosion by applying too much at once, of course alternately drying and applying sodium bicarbonate in the sulphuric process; picking out debris as you proceed, with greatest care when nearing the apex. When sure that you have removed everything, dry thoroughly, and vaporize an antiseptic—formalin twenty per cent or 1:10,000 sublimate solution. Then take a small filament of cotton wool saturated in iodoform and eugenol, adjust loosely in the canal, sealing lightly with gutta-percha stopping, or cotton and varnish. Apply aconite and iodin in equal parts to both sides of the root, instruct the patient to remove temporary stopping if irritation supervenes, and dismiss him for a few days. On the return of the patient, if pyrozone gives no indication of pus, fill as advised in the first section.

(3) *Pulps in which are Found Filaments Still Living and Sensitive.* When the pulp is too sensitive to permit of immediate extirpation the usual course is to apply an arsenical preparation. But how can the pulp absorb the devitalizer when the blood vessels are inactive and semi-dead, yet upon inserting a nerve-broach in the

canal the filaments are found to be still sensitive. A successful method of treatment is as follows: After adjusting the rubber dam, where permissible remove as much of the filaments as possible, using cocain or some other obtundent. When the canal has been thoroughly dried apply a tanning agent, alum paste (Söderberg's), or tannic acid and glycerin, on non-absorbent cotton wool, and lightly seal in the canal. A few days afterward the filaments may be painlessly removed, after which procced to fill the root as described in the first part of this paper.

Treatment of Abscessed Roots. When pyogenic bacteria penetrate through the apical foramen and set up inflammation alveolar abscess is the result. The prognosis of alveolar abscess is particularly marked, the pain attending it being deep-seated and throbbing. Abscesses are divided into two classes: Acute and chronic. (1) The acute abscess, having no exit for the pus, is usually met with in a very severe form, with rapid inflammation of the surrounding tissues. (2) The chronic form is caused by the inflammation remaining and entering into a permanent form, and sometimes establishing a sinus through the alveolar process for the pus to escape. It is particularly the chronic form that requires careful treatment, and it will not yield to treatment as readily as will the acute form.

Treatment. The therapeutic treatment consists of first removing all irritating bodies from the pulp-cavity, which should be freely opened to the apex of the canals, and the application of antiseptic remedies—hydrogen dioxid, injected slowly into the canal, may be used to advantage—followed by such agents as will cause the destruction of the sac, viz., zinc chlorid, etc., or usually the sulfuric acid process. Where a sinus has been established it should be enlarged with a sharp-pointed bistoury, and zinc chlorid injected through the canal and sinus, its contact with the mucous membrane being prevented by the use of napkins, cotton wool, etc. Now dry the canal and vaporize an antiseptic—formalin 20 per cent or 1:10,000 sublimate solution—and after thoroughly drying, fill the canal loosely with cotton wool saturated with iodoform and eugenol, sealing lightly with gutta-percha stopping. Apply aconite or iodin in equal parts to both sides of the root. Instruct the patient to remove the temporary stopping if irritation supervenes, and discharge him for a few days. On the next visit, if on the application of pyrozone no pus is found to be present, fill with gutta-percha,

taking the usual precautions to thoroughly dry the root, and close the apex with a non-irritant and antiseptic filling material.

Periodontitis. Independent of alveolar abscess—although usually a premonitory stage of it, as it rarely occurs before the pulp has lost its vitality—is the condition known as periodontitis or pericementitis, which denotes inflammation of the peridental membrane surrounding the roots of the teeth.

Diagnostic. Tenderness and inability to comfortably masticate food, but unaccompanied with violent pain as in alveolar abscess.

There are two forms of periodontitis, the acute and chronic. The acute form is generally due to direct local irritation, and is readily diagnosed by the pain caused when pressure is applied to the affected tooth. The symptoms of the acute variety are a slight sensation of uneasiness and tension and a feeling of fullness about the affected part, with a desire to press the teeth together.

The chronic form is a modified stage of the acute, and the symptoms are soon followed by a dull, heavy, and continuous pain; occlusion of the teeth gives rise to severe pain, and there is an inclination to keep the jaws apart. At this stage other teeth may become affected, and the appearance of the gum surrounding the root of the affected tooth assumes a deep purple color. In pulpless teeth the peridental membrane is very susceptible to inflammation, owing to the weakened condition of this membrane, and even during the process of devitalization inflammation is sometimes set up.

For the treatment and filling of the roots in this form of periodontitis, see class (1) in the first part of this paper. While pursuing the treatment great care should be exercised by applying soothing applications to the mucous membrane—iodin, aconite, etc.—and in seeing that the root is reduced beyond the line of occlusion. Relief will be found to speedily follow on removing the cause. The following are a few of the causes: Putrescent pulp, defective occlusion, salivary calculus, loose teeth, and mechanical irritation.—*Cosmos.*

GOLD INLAY BRIDGEWORK. By Ernest J. Eisen, D.D.S., Milwaukee. While inlay bridgework has nothing about it which would stamp it as new, still certain points in its construction might present it in a more favorable light. By following pretty closely the lines laid down in cavity preparation as practiced to-day, this method in certain cases is not only attractive but fairly indicated over

others. Where the second bicuspid or first molar is missing in either upper or lower denture, provided the first bicuspid and molar are in good condition; in the presence of facing approximal cavities; or where teeth are affected by pyorrhea with gradually receding surrounding tissue—these conditions present most satisfactory phases; the first for esthetic reasons, the latter because of its advantages in a prophylactic sense, for it makes possible the continual visual control of the condition of tooth and gums.

The generally accepted rules for cavity preparation, *i. e.*, angular cavities and extension to or beyond the "brush line," should be the guiding principle of all gold inlays for bridgework. The walls

FIG. 1.

FIG. 2.

FIG. 3.

should be absolutely parallel, the base flat, and the fissure extension flat with a greatly enlarged dovetail the shape of a T at the distal end.

Provided all the walls are parallel and the base of the cavity is flat, platinum foil may be burnished into place and removed with as much ease as though the cavity were rounded and shallow. Great care must be taken to give the cavity sufficient depth in order to get the greatest strength and solidity. It has been my practice to sink a dovetail or T about one-sixteenth of an inch lower than the fissure which is at right angles to it. This adds greatly to the strength of the inlay and places the strain at the most favorable point.

In preparing a cavity for a gold inlay, be it for a filling or as an abutment for a bridge, it is well to consider that the portion of tooth most liable to fracture through strain or direct force is the partially obliterated cusp. The reduction of the anterior buccal cusps in molars and the building of the inlay to its original proportions will give added strength and will avert any fracture of tooth-structure

at this point. And not only this, but if it be made a practice to reduce the anterior buccal cusps in molars where an inlay is indicated, one will find that besides adding strength the reduction will aid in removing the matrix from the cavity, and make all cases comparatively easy to handle.

The burnishing of the platinum matrix should proceed as for any porcelain or gold inlay, with the exception of its repeated removal and reannealing, and prior to the last insertion the cavity should be thoroughly swabbed out with vaselin. Sticky-wax should now, with matrix in place, be forced into the cavity with as little surplus as possible. Any surplus should be removed with a warm instrument and the approximal portion be given the shape desired for the inlay. The entire impression should now be removed and invested so that all but the masticating surface is surrounded; this is left open so as to be visible from above. When the impression has hardened the wax should be boiled out and the entire investment brought up to a high degree of heat. Molten gold, 20 to 22 k., may now be run into the matrix. Made in this way an inlay will require but little trimming, and as a rule will fit more perfectly than when one piece of gold after another is flowed in.

The completed inlay should now be placed in position and an impression in plaster taken. Some difficulty may be met with in determining the exact position of the inlay in the impression unless it is marked in some way. A cross (×) may be filed on the surface, but I have found it much more satisfactory to place several little spurs of wax on the inlay in such a position as to allow the plaster to be withdrawn without disturbing either inlay or "markers." Prior to investing for soldering it might be well to paint the under side of the inlay with a solution of precipitated chalk, thus averting any possibility of solder running in.

A well-fitted inlay bridge in desirable cases is a gratifying piece of work, and when once mastered is by far the most satisfactory and interesting to patient and operator.—*Cosmos.*

LABORATORY HINTS. By D. E. Sheehan, D. D. S., Hamilton, O. *An Aid in Carrying Pumice.*—When using felt cones or wheels in polishing rubber plates, gold crowns, etc., hold a piece of soap against the wet cone before applying the pumice. The soap on the cone prevents too much heat and will also carry the pumice.

To Keep a Supply of Soft Wax.—Punch a hole the size of your Bunsen burner in the bottom of a seamless salve-box. Push this down to a point just above the air-holes in the burner and solder in place. Fill box with scrap wax, and when the burner is in use you will always have an abundance of soft wax. With this convenience you will save the time usually consumed in picking up and balancing a piece of hard wax on the end of your spatula while heating it.

To Prevent Bruising Plate When Swaging.—In swaging metal plates, that you may not bruise your plate, get a rubber tip such as is usually used on crutches. Put this on the large end of your horn mallet and proceed.

Soldering Hint.—When you solder your bridge first of all have the investment hot. When using the blowpipe do not blow a strong blast, but blow gently enough to have a yellow streak in the flame from the pipe to the piece to be soldered. The yellow streak is essential. You can drag the solder with a piece of strengthening bar stuck in the end of a pine stick.

To Burnish Backing Over the Edges of Teeth.—In backing up facings for bridges and crowns with heavy plate, especially cuspids, it is sometimes hard to burnish the backing over the incisive edge. To facilitate matters split the backing in several places parallel with the long axis of the tooth to the line where the plate is to bend. It will then burnish over easily. Go over this surface once with a file and it will hug the tooth perfectly.

Rapid Repair.—For rapidly repairing a plate when one or two teeth are broken out, dovetail the plate back of the pins set in the tooth and pack in a quick-setting amalgam. It will hold as well as a rubber patch.

Care of Seamless Crown Outfit.—Before putting away your seamless crown outfit after using, paint the holes in the draw-plate with oil. This prevents rusting of the plate, and the oil prevents stretching and consequent thinning of the gold in your crowns. Never drive gold through dry holes.—*Summary.*

Sterilization of Septic Cavities.—The mere fact that it is impossible to thoroughly sterilize some of the cavities of the body is no excuse for not doing as much as possible in this direction before operating upon them. Thorough washing out at any rate removes the excess of bacteria and of secretions favorable to their development, and improves the facilities for obtaining good drainage.—*Internat. Jour. of Surg.*

The Dental Digest.

PUBLISHED THE FIFTEENTH DAY OF EVERY MONTH
At 2231 Prairie Avenue, Chicago,
Where All Communications Should be Addressed.

Editorial.

IDENTIFICATION BY THE TEETH.

The following note was found in one of the Chicago newspapers after the recent Iroquois Theater fire—"Dentists have been brought into service by persons looking for missing friends and relatives among the misshapen and fire-scarred bodies that have not been claimed. In many cases the only hope of identification lies in the knowledge dentists may have of the mouths of former patients." Not only did Chicago dentists render valuable assistance in this regard, but practitioners from other cities came to identify the teeth of supposed patients, and in many cases were successful. A dentist in Marshalltown, Iowa, recently identified a man by the skull and some of the teeth, decomposition having progressed so far that other identification was out of the question. Many instances of the same nature might be cited. Murderers have been detected and innocent ones have been freed of the charge by the same means, and life insurance companies are coming to depend more and more upon the dental profession when a dispute arises over payment of a claim. In fact, the teeth of dead persons have long served for identification, as they are the most indestructible portion of the anatomy, and usually remain after every other part of the body has become unrecognizable. Dentists should in every instance keep a careful record of all work done, both for their own guidance and for the benefit of their patients. Many practitioners, however, do not believe this is necessary, and it is to these especially that this editorial is directed. If they care not for their own convenience or for the welfare of their patients when living, perhaps the importance of being able to identify the latter when dead by means of records and charts may appeal to them. Certainly their inability to do so if the necessity ever arose would be a source of lifelong regret.

REFERENCES REPUDIATED.

Our readers will remember that in the December issue we published an editorial concerning the International Cooperative Dental Association, and also a letter from State Senator A. C. Clark to the effect that his name had been used as a reference by the Association without his knowledge or authority. Furthermore, that the name of Dr. J. Roland Walton of Washington, D. C., had been put on the Association's list of directors without his consent or knowledge. (In passing we might mention that Mr. Clark and the publisher of the DIGEST have been sued for $50,000 damages by the Association because of the matter published in our last issue. If anything of interest develops we will acquaint our readers of the fact.)

It seemed probable that if the names of these two gentlemen had been used without their consent the same might be true in other cases, so we wrote to all those whose names had been used as references or who were listed as directors. In the circular sent out by the Association six men were given as references, and the following replies were received from them—Gov. Yates said, "I have not authorized the International Cooperative Dental Association to use my name as a reference." Wm. Penn Nixon said, "I have no recollection of ever hearing of this International Cooperative Dental Association, and I do not think any one ever asked the privilege of referring to me. I would not want to vouch for it by any means, although it may be straight for all I know." Senator Clark had already been heard from. Of the three remaining, all prominent politicians of Illinois, two did not reply, and the third stated that the Association had not asked the privilege of referring to him, but that he had no objection to its so doing. The resume shows that four at least of the six names given as references were used without their owners' consent or knowledge.

In addition to L. A. Melze, the president of the Association, the names of five dentists were given as directors. In response to our letter asking whether they had consented to the use of their names the following replies were received—Dr. T. P. Williams of Houston, Texas, said, "I have never authorized the International Cooperative Dental Association to use my name as a director, charter member, or in any other manner." Dr. J. Roland Walton had already stated that he had been listed as a director without his consent. Dr. O. H. Simpson of Dodge City, Kas., wrote, "When I received a letter from

the International Cooperative Dental Association I was favorably impressed and replied to that effect. A few days later I received a circular from them quoting from my letter, which aroused my suspicion, and I at once wrote requesting that they drop my name, but as yet have received no reply." The remaining two of the five stated that they had consented to the use of their names as directors. Dr. W. G. Mason of Tampa, Fla., has written asking us to publish a brief statement from him, which we do herewith—"I paid no attention to the first letter received from the International Cooperative Dental Association, but when the second one came, asking me to serve on the board of directors and stating that I would be exempt from the initiation fee and monthly dues, I gave my consent to become a charter member and director without knowing anything about the merits of the Association, as it sounded a little large to be a director and as it was to cost me nothing. I think now that I have made a mistake, and inasmuch as I have been quoted by the Association I wish the profession to know that I think so. The quotation from me making me out as president of our state dental examining board was without my consent or knowledge and I am only a member of said board. I have sent in my resignation to the Association and expect to have nothing more to do with it. I had a communication from the secretary recently setting forth some of the principles of the organization, some of which I cannot subscribe to."

In view of the above facts it seems hardly necessary for us to make further comment.

Notices.

MICHIGAN STATE EXAMINING BOARD.

The Michigan State Board of Dental Examiners will meet in Grand Rapids, May 10, 1904, for the examination of applicants to practice dentistry. For further information address the secretary.

W. C. McKINNEY, Secy., Saginaw.

NEW HAVEN DENTAL ASSOCIATION.

The New Haven Dental Association will hold its annual meeting in Harmonic Hall, New Haven, Conn., March 15-16, 1904. A cordial invitation is extended to all ethical practitioners of dentistry to attend.

E. FRANK CORY, Secy.

CALIFORNIA STATE EXAMINING BOARD.

The California State Board of Dental Examiners will hold its next examination in San Francisco, beginning May 23, 1904, and will also hold an examination in Los Angeles, beginning June 13, 1904.

F. G. BAIRD, Secy., 502 Sutter St., San Francisco.

MASSACHUSETTS BOARD OF REGISTRATION.

The next meeting of the Massachusetts Board of Registration in dentistry for the examination of applicants will be held in Boston, March 9-11, 1904. Application blanks and all necessary information furnished by the secretary.

G. E. MITCHELL, Secy., 25 Merrimac St., Haverhill, Mass.

VERMONT STATE DENTAL SOCIETY.

The twenty-eighth annual meeting of the Vermont State Dental Society will be held at Hotel Pavilion, Montpelier, March 16-18, 1904. We anticipate a pleasant as well as a profitable meeting, and a cordial invitation is extended to all.

THOS. MOUND, Secy., Rutland.

IOWA STATE DENTAL SOCIETY.

The forty-second annual meeting of the Iowa State Dental Society will be held at Des Moines, May 3-5, 1904. A good program has been prepared, and an interesting meeting is expected. The profession is cordially invited to be present.

C. W. BRUNER, Secy., Toledo, Ia.

NEW JERSEY STATE DENTAL SOCIETY.

The New Jersey State Dental Society will hold its next annual meeting in the auditorium at Asbury Park, July 21-23, 1904. The exhibit committee is now prepared to allot space to exhibitors. All applications should be made direct to the chairman.

W. G. CHASE, Chairman, Princeton.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The National Association of Dental Examiners will hold its annual meeting in the Coliseum Bldg., 13th and Olive Sts., St. Louis, Aug. 25-27, 1904, beginning promptly at 10 a. m. Telephone and telegraph in the building. Hotel accommodations will be secured for the members.

CHAS. A. MEEKER, Secy., 29 Fulton St., Newark, N. J.

CALIFORNIA STATE DENTAL ASSOCIATION.

The California State Dental Association and the Alumni Association of the University of California Dental Department will meet jointly in annual session May 16-19, 1904. Eastern specialists on Porcelain and Orthodontia have been invited to give a course of instruction on their subjects at this session,

and efforts are being made to eclipse all previous meetings from the standpoint of progress and interest to the profession.

GUY S. MILLBERRY, Secy. Joint Committee, 1202 Sutter St., San Francisco.

INSTITUTE OF DENTAL PEDAGOGICS.

The annual meeting of the Institute of Dental Pedagogics was held in Buffalo Dec. 28-30, 1903, and the following officers were elected: President, H. B. Tileston, Louisville; Vice-president, W. H. Whitslar, Cleveland; Secretary and Treasurer, W. E. Willmott, Toronto; Executive Committee, D. R. Stubblefield, Nashville; R. H. Nones, Philadelphia; L. P. Bethel, Columbus, O. The next annual meeting will be held at Louisville.

IN MEMORIAM—DR. JONATHAN TAFT.

WHEREAS, It has pleased the Divine Ruler to call into eternal rest Jonathan Taft, who passed the portals of the great unknown October 15, 1903, after a long and vigorous career of usefulness in the profession; and

WHEREAS, This Society especially feels his demise from the fact that one-half of the members constituting this body have received a large portion of their early dental knowledge and training directly from his lips; and we further recognize that he was unique in his power to impress upon the pupils who sat under his instruction sound principles of ethics and practice. He was great in his goodness, a characteristic which stands as a shining light for others to see and follow in his footsteps; therefore, be it

Resolved, That the Odontological Society of Chicago hereby testifies to the loss experienced by the profession in the death of Dr. Taft, and extends sympathy to the family in their bereavement; also

Resolved, That these resolutions be spread upon the records of this Society, and that a copy be forwarded to the dental journals for publication.

Adopted January 12, 1904.

J. G. REID,
L. L. DAVIS,
J. W. WASSALL,
Committee.

SOUTHERN BRANCH NATIONAL DENTAL ASSOCIATION.

The annual meeting of the Southern Branch of the National Dental Association will be held in Washington, D. C., Feb. 23-26, 1904. The Association will meet conjointly with the District of Columbia and Maryland State Dental Associations, in response to an invitation from those organizations. The opening meeting will be held in Columbian University Hall, 15th and H Sts., N.W. The clinics and other meetings will be held in the Medical and Dental Department Building of Columbian University on H St., between 13th and 14th Sts. There will be a banquet at the New Willard Hotel, on Thursday evening, February 25, given by the Maryland State Den-

tal Association and the District of Columbia Dental Society to the Southern Branch of the National Dental Association as their guests.

The list of exhibitors is unusually large, affording an opportunity to see the newest equipment for office and laboratory and the latest in therapeutic agents. The Southeastern Passenger Association grants a rate of one and one-third fare, plus twenty-five cents, on the certificate plan, from all points in the territory south of the Ohio, Potomac, and east of the Mississippi Rivers. The hotels of Washington have granted reduced rates as follows: The New Willard (headquarters), $2.50 and up, European plan. The Raleigh, $2 and up, European plan. The Ebbitt, $3 and up, American plan. The Riggs, $3 and up, American plan. The Oxford, $2 and up, American plan. The Hamilton, $2.50 and $3.50, American plan.

All practitioners who conduct themselves according to the code of ethics are cordially invited to attend. Ample provision will be made at the University for clinics and exhibits. It is incumbent upon every dentist interested in the progress and welfare of his profession to attend this meeting, for in so doing he will not only fulfill his duty but will derive much benefit.

The following is a partial list of the papers and clinics that have thus far been promised—Papers. The Preservation of Temporary Molars and Cuspids, N. N. Vann, Attalla, Ala. Subject to be announced, T. M. Milam, Little Rock, Ark. Cavity Lining, Importance and Value in Operative Dentistry, A. C. Hewett, Chicago. Punctured and Split Roots and Their Treatment, Joseph Head, Philadelphia. The Limitations of Dental Prophylaxis, M. L. Rhein, New York. Filling Root-canals, L. G. Noel, Nashville. The Four Year Course—Is It Necessary? H. F. R. Snyder, Baltimore. Extensive Bridging After Pyorrhea, Fred. Primrose, Baltimore. Porcelain, L. W. Farinholt, Baltimore. The Tactful Management of Young Patients, T. O. Heathwole, Baltimore. Oral Sepsis in Childhood with Its Attendant Evils, Bessie B. Bennett. Paper by the Annual Essayist, J. A. Chapple, Atlanta. The Two Sources of Tooth Life and Their Relative Importance, D. D. Smith, Philadelphia. The Educational Value of the Study of Dental History, with one hundred Lantern Slide Illustrations, Chas. McManus, Hartford, Conn. Common Mistakes Made in Articulating Full Dentures, E. M. Kettig, Louisville. Something or Other About Chemistry, D. R. Stubblefield, Nashville. Various Reforms in Prosthodontia, S. H. Spence, Chattanooga. Vulcanite—Various Tests and Results, J. A. Hall, Collinsville, Ala. Subject to be announced, Wms. Donnally, Washington. Education, Duty, Faith, J. H. Crossland, Montgomery, Ala. Clinics: Changing the Shape of Irregular Natural Teeth in Adults by Means of Silk Twist, Robt. E. Payne, New York. Construction of Artificial Vela for Cleft Palates, R. Ottolengui, New York. Adhesion of Cement to Porcelain and Dentin, W. (V-B.) Ames, Chicago. Central Incisor, Mesio-Proximal-Occlusal Surface, Dealing with Flat Surfaces and Angles, T. S. Waters, Baltimore. Use of the New Front Tooth Matrix, Wm. Crenshaw, Atlanta. Filling Teeth with Soft and Cohesive Gold in Combination, C. L. Alexander, Charlotte, N. C. Gold Inlays for Contour Work, A. M. Jackson, Macon, Ga. Oral Surgical Clinic, G. V. I. Brown, Milwaukee. To be announced, W. B. Finney, Baltimore. Treatment

of Proximal Spaces, C. M. Gingrich, Baltimore. Construction of Saddle Bridge, C. J. Grieves, Baltimore. To be announced, A. C. Brewer, Baltimore. Treatment of Sensitive Dentin with Gas Apparatus, Joseph Roach, Baltimore. To be announced, N. T. Shields, New York. Crib Attachment for Artificial Dentures, H. E. Kelsey, Baltimore. Matrices in Plastic Work, G. E. Hardy, Baltimore. A Gold Filling, H. D. Harper, Kinston, N. C. Filling Cavity on Distal Surface of an Upper Bicuspid, J. S. Betts, Greensboro, N. C. Porcelain Inlay, C. A. Rominger, Reidsville, N. C. To be announced, E. J. Tucker, Roxboro, N. C. L. G. NOEL, Chairman Program Committee.

C. H. FRINK, Cor. Secy., Fernandina, Fla.

The papers and clinics will be published in the DENTAL DIGEST.

News Summary.

NEVER JUDGE women or cigars by their wrappers.

R. E. FINLEY, aged 53, a dentist of Coshocton, Pa., died Jan. 1, 1904.

W. J. FOGLE, 68 years old, a dentist of Columbus, Ga., died Jan. 14, 1904.

E. S. MESSINGER, a dentist in New York, died Jan. 4, 1904, of pneumonia.

A. M. MARTIN, a dentist at Trezevant, Tenn., died suddenly Dec. 20, 1903.

JOHN H. BATCHELDER, 86 years old, a dentist at Salem, Mass., died Jan. 8, 1904.

A. W. MAXWELL, 74 years old, a retired dentist at Cleveland, died Jan. 20, 1904.

J. B. SIMPSON, a dentist at Redlands, Cal., died Dec. 22, 1903, of tuberculosis.

C. S. GRADY, a dentist at Columbia, Ky., accidentally shot himself Jan. 1, 1904.

W. J. BLACK, a dentist of Muskogee, I. T., killed a man in a quarrel Jan. 1, 1904.

J. F. GILMOUR, 58 years old, a dentist at Columbus, Ga., died of appendicitis Jan. 5, 1904.

J. R. HEWITT, 74 years old, a dentist at Sharon, Pa., died of paralysis Dec. 20, 1903.

M. MARCUS, 27 years old, a dentist at Mingo, O., died Jan. 17, 1904, of pneumonia.

M. H. LEECH, a dentist at Liberty, Ind., 50 years old, committed suicide Jan. 4, 1904.

W. J. KEENAN, 28 years old, a dentist at Cambridge, Mass., died suddenly Dec. 2, 1903.

EDWARD VOGT, 48 years old, a dentist at Philadelphia, committed suicide Dec. 28, 1903.

M. B. RIMES, a dentist of Chicago, was killed in the Iroquois Theater fire, Dec. 30, 1903.

A. J. OAKEY, a dentist of Chicago, was killed in the Iroquois Theater fire, Dec. 30, 1903.

STEPHEN LEE, 81 years old, a retired dentist at North Scituate, R. I., died Dec. 30, 1903.

GEORGE W. FRANK, 76 years old, a retired dentist at Ithaca, N. Y., died of apoplexy Jan. 11, 1904.

GIVE THE HYPOCHONDRIAC two drams of sodium sulfate three or four times a day.—*Med. Summary.*

J. R. CAMPBELL, for many years in the practice of dentistry at Sandersville, Ga., died Jan. 8, 1904.

PERRY WESLEY, 35 years old, a dentist at Middleburg, Ky., died Jan. 7, 1904, of hemorrhage of the lungs.

T. B. WELCH, 78 years old, died at Overbrook, Pa., Dec. 29, 1903. He was well known as a dentist, editor and manufacturer.

CHARLESTON (W. VA.) DENTAL SOCIETY was organized Jan. 4, 1904, and the following officers were elected: President, J. N. Mahan; Secretary, H. S. Barr.

VULCANIZER EXPLODES.—Dec. 16 a vulcanizer exploded in the dental office of Robt. Grant at Austin, Tex., breaking the windows and blowing a hole in the ceiling.

LICENSE TAX DEFEATED.—An ordinance imposing a license tax of $10 each on all dentists in Versailles, Ky., was defeated this month after a hot fight and a close vote.

BANQUET TO DR. HARPER.—Dec. 18 a number of St. Louis dentists gave a banquet in honor of Dr. John G. Harper of that city, and presented him with a handsome silver service.

TOOTHACHE CAUSES DEATH.—Last month a woman in Missouri, apparently in good health, suffered for some hours with a severe toothache and then died instantly in a paroxysm of pain.

RESIGNATION OF DR. HARPER.—Dr. W. E. Harper, Secretary of Northwestern University Dental School, has resigned and will give up that office at the end of the present school year.

INDISPENSABLE.—I can't get along without the DIGEST. E. J. Tucker, Roxboro, N. C.—I certainly enjoy reading the DIGEST more than any other dental journal. H. S. Engle, Wayne, Ia.

FREEPORT (ILL.) DENTAL SOCIETY held its annual meeting and banquet Dec. 28, 1903, and elected the following officers: President, F. S. Trickey; Vice-president, F. M. Carl; Secretary, E. H. Place.

WHAT'S SAUCE FOR THE GOOSE.—Mrs. Brown (nudging Brown, who snores) —"William! you'd make less noise if you'd keep your mouth shut."

Mr. Brown (half awake)—"So'd you."—*Life.*

SCHOOL PROPHYLAXIS SOCIETY.—According to newspaper report the

borough schools of Doylestown, Pa., have a society of students whose object is to have the scholars take proper care of their teeth.

WATERVILLE (ME.) DENTAL SOCIETY held its annual meeting Dec. 31, 1903, and elected the following officers: President, E. H. Kidder; Vice-president, M. S. Johnson; Secretary and Treasurer, G. A. Smith.

SOME CONSOLATION.—"Nebber try to comfort a man wif de toothache," said Uncle Eben. "Let him go ahead an' hab de satisfaction of thinkin' dat he's got de entire toothache record beat."—*Washington Star.*

SEATTLE (WASH.) DENTAL ASSOCIATION held its annual meeting Jan. 4, 1904, and elected the following officers: President, C. A. Custer; Vice-president, E. S. Barnes; Treasurer, C. L. Nelson; Secretary A. B. Palmer.

DISTILLED WATER FOR MIXING PORCELAIN.—In mixing porcelain body for inlays or crown work always use alcohol or distilled water. All hydrant water is liable to contain some mineral in solution.—*Dominion Dent. Jour.*

CAPITOL CITY (MICH.) DENTAL SOCIETY held its annual meeting at Lansing, Jan. 5, 1904, and elected the following officers: President, R. W. Morse; Vice-president, W. T. Shaw; Secretary, A. N. Lawrason; Treasurer, F. N. Waggoner.

WESTERN INDIANA DENTAL ASSOCIATION elected on Jan. 11, 1904, the following officers for the ensuing year: President, O. M. Brown, Terre Haute; Vice-president, W. G. Rice, Terre Haute; Secretary and Treasurer, B. B. White, Terre Haute.

KNIFE AS A TOOTHPICK.—A man in Indiana recently picked his teeth with a knife and wounded the gum. The flow of blood continued for a week and a dentist then stopped it. We trust the man's ideas on table etiquette will be improved by the occurrence.

LYNN (MASS.) DENTAL SOCIETY held its annual meeting Dec. 17, 1903, and elected the following officers: President, E. H. Brock; Vice-president, John Kennedy; Secretary, B. W. Percival; Treasurer, E. W. Marvin; Executive Committee, M. C. Smith, N. G. Gammon, E. J. Hayes.

ALLEGANY COUNTY (N. Y.) DENTAL SOCIETY held its annual meeting at Alfred, Jan. 15, 1904, and elected the following officers: President, J. F. Sortore, Belmont; Vice-president, John Common, Andover; Secretary, W. T. Spargur, Wellsville; Treasurer, E. V. Sheerar, Wellsville.

LORAIN COUNTY (O.) DENTAL SOCIETY held its annual meeting Jan. 12, 1904, and elected the following officers: President, J. G. Wherry, Elyria; Vice-president, C. S. Kelsey, Elyria; Secretary and Treasurer, J. S. Ewald, Lorain. The next meeting will be held at North Amherst in April.

READING (PA.) DENTAL SOCIETY held its sixth annual meeting Jan. 7, 1904, and elected the following officers: President, W. H. Scholl; Vice-president, Chas. Grim; Secretary, C. R. Scholl; Treasurer, Elwood Tate; Executive Committee, George S. Schlegel, E. W. Bohn, S. E. Tate.

SUITS WON BY DENTISTS.—A dentist at Peoria sued a patient for $110 for services for self and family, and obtained a judgment in his favor.—A dentist at Pittsburg sued a man for regulating his daughter's teeth. His bill was

$150, but at the trial the fact was brought out that she had made 105 visits to his office, so the jury allowed the dentist $105—a dollar a visit.

AMMONIA FOR CLEANSING THE HANDS.—To clean the hands after doing laboratory work, keep a bottle of household ammonia at hand and pour a dram into the basin of water used for washing the hands. The result will be magical.—*Dominion Dent. Jour.*

BANKRUPT.—A. T. Kline, a dentist of Toledo, O., filed a petition in bankruptcy Dec. 24, 1903, listing his debts at $7,871 and his assets at $48.—H. N. Stone, a dentist at Newburyport, Mass., filed a petition in bankruptcy Dec. 21, giving his liabilities at $3,745 and his assets at $400.

PUPILS IN PHILADELPHIA TO BE INSTRUCTED.—The Board of Education of Philadelphia at its January meeting voted to give consideration to the request of the National Dental Association, asking the cooperation of the Board in arranging for short talks to parents, teachers and pupils on the preservation and care of the teeth.

BATH NEARLY FATAL.—Last month a dentist in Detroit went to a barber shop to take a bath, and after locking the door of his room he accidentally turned on the gas, which soon overcame him. The barber noticed the smell and broke open the door in time to save the dentist's life. He should have known better than to attempt a bath this cold weather.

ELECTRIC BATH.—The electric bath is one of the newest things, although it isn't a bath at all. A thick robe is entwined with wires, and this is donned. Then a current of electricity is switched on, and the wearer of the electric robe soon finds his body getting warmer, until in a little while he perspires as freely as if he were in a Turkish bath.—*Med. Times.*

DETECTION OF FORMALDEHYD.—Professor Brundage gives a simple and convenient test in his "Manual of Toxicology," as follows: Dissolve a decigram of morphin in 1 c.c. of sulfuric acid; gently add, without mixing, an equal volume of the suspected liquid; if there be any formaldehyd present the liquid will soon assume a reddish violet color.—*Amer. Druggist and Pharm. Record.*

WABASH (IND.) DENTAL COTERIE was organized Jan. 18, 1904, and the following officers were elected: President, A. L. Stephenson; Vice-president, L. G. A. Powell; Secretary, M. A. Payne; Treasurer, C. Snideman; Advisory Board, A. G. Smith, H. A. Fisher, F. E. Grafft. The organization comprises all the dentists in the town, and such an example of harmony might well be adopted by other towns and cities.

WIGGLED LIPS TO KEEP TEETH IN.—A man in New York was recently adjudged insane and sent to an asylum. One of the medical "experts" pointed out the tremor of his lips as one proof of his insanity. The fact developed later that the man was perfectly sane and that he had been imprisoned on a conspiracy, so he was released. He and his dentist then explained that the tremor was caused by his effort to keep his false teeth in place.

AMERICAN DENTIST ACQUITTED IN PARIS.—A dentist in Paris, practicing under the diploma of a Philadelphia dental college, indicated his calling by

the simple title of "Doctor" on his sign. The Paris Dental Society brought suit against him, claiming that the sign deceived the public as to the real character of his calling and that he did not make known the foreign origin of his diploma. The lower court fined him $25, but the upper court acquitted him.

DESQUAMATION OF THE TONGUE.—

R—Cocain hydrochlorid, 7 grains;
Balsam of Peru,
Boric acid, āā 15 grains;
Vaselin, 10 drams. M.

Sig.—Apply on the tongue twice daily.—BESNIER, *l'Odontologie.*

DIVORCES.—W. B. Estes, a dentist at San Francisco, has sued his wife for divorce, alleging cruelty.—Edith Foster is suing her husband, J. Arthur Foster, a dentist of San Antonio, Tex., for divorce.—B. G. Miller, a dentist of Buffalo, has been granted a divorce from his wife.—Tilly F. McNally is suing her husband, Edward T. McNally, a dentist at Pasadena, Cal., for divorce.—W. J. Rice, a dentist of Mason City, Ia., has been granted a decree of divorce from his wife.

DIAGNOSIS EASY.—The new medical student from the country had a bad cough. His expectoration made the old doctor anxious, and hoping to diagnose the case with a view to relieve the sufferer, he asked:

"What do you raise?"

"Hogs," was the prompt reply.

"It is as I thought," responded the doctor; "tie a piece of fat pork around your throat."—*Medical Brief.*

INVESTED IN COPPER.—An itinerant dentist recently hung out his shingle at the hotel in a New Jersey town, and by liberal advertising and large promises drew a number of patients to his office. He advised gold fillings in nearly all cases, and made what seemed to be a reasonable charge for the work. He left town suddenly one night, and his customers have now discovered that he used an alloy of copper instead of gold. The reputable dentists of the town are now working overtime.

TENTATIVE DIAGNOSIS.—Nothing has a greater tendency to increase a man's skill in inductive reasoning than the habit of writing down after each examination the diagnosis that seems to him most likely, no matter how many question-marks he puts after it, or how frequently he changes this diagnosis at subsequent examinations. The very necessity of putting in concrete form what is too often a hazy idea sharpens the faculties and stimulates the mental processes.—*Phila. Med. Jour.*

A NEW BREAKFAST FOOD.—Secgrohic!

Something entirely new! The greatest discovery of the age!

A revolution in breakfast foods!

All the wood that's fit to eat!

Secgrohic is the sawdust of second-growth hickory. It sells at the same price as do the ordinary breakfast foods made of dead and down timber.

Why not have the best when it costs no more?
Every package sterilized.—*Puck.*

CALCIUM CHLORID AS A LOCAL STYPTIC.—T. W. Parry's patient (*Lancet*) was a boy of seven and a half years, who when first seen was bleeding from a cleft between the left lower first permanent molar and the temporary molar immediately in front of it. No other source of blood could be discovered, even under anesthesia. All sorts of styptics were used on cotton pledgets packed between the teeth, but without avail. Finally the hemorrhage was checked by plugging the cleft with cotton dipped in a solution of calcium chlorid thirty grains to the ounce.

CONGESTED GUMS.—In the treatment of congested gums, whether involved in pyorrhea alveolaris or not, iodid of zinc in crystal form has often been recommended and applied with much success. It is one of the most effective agents to restore the gums to their normal form, but it occasionally seems to induce sensitiveness of the teeth, and the taste is objectionable to some patients. To overcome these limitations the crystals may be mixed with one of the essential oils to the consistency of a syrup. Applied in this form it is fully as effective and much more acceptable.—*Review.*

TO REMOVE PLASTER OF PARIS FROM THE HANDS.—Sugar placed in water, or the use of simple syrup, will greatly facilitate the removal of plaster of Paris from the hands, after applying plaster dressings. The use of sweet oil is also serviceable for this purpose.—*Intern. Jour. of Surg.*

Vinegar or oxalic-acid solution will also do the work satisfactorily. The vinegar especially leaving the skin soft and pliable and entirely free from the harshness which the plaster leaves after washing the hands in plain soap and water.—MILES F. PORTER, *Ft. Wayne Journal Magazine.*

EXAMINING BOARD AFFAIRS.—Jan. 16 Governor Van Sant appointed S. R. Holden of Duluth as a member of the State Board of Dental Examiners for three years to succeed J. W. Weirick of St. Paul.—A man at Hendersonville, N. C., some months ago brought suit against the State Board of Dental Examiners to recover $5,000 damages and to force the board to grant him a license. Dec. 17 the Supreme Court of the State decided against him and upheld the Board.—At the last meeting of the Pennsylvania State Board of Dental Examiners 56 out of 75 applicants successfully passed the examination.

DEVIATION OF MANDIBLE FROM SIDE AFFECTED BY INJURY.—In injuries about the lower jaw, affecting one side at or above the level of the angle, as after a severe blow from a fist, there is often a slight deviation of the jaw away from the affected side. This might lead one at first to think of partial dislocation, were it not for the fact that the jaw can easily be pushed toward the median line. The cause lies in the fact that the muscles on the injured side are relaxed as much as possible by the patient, owing to the pain caused by their contraction after an injury.—*Intern. Jour. of Surg.*

EYE SHOULD HAVE A BROAD RANGE.—An optician says, "One should have

the opportunity of seeing a long distance. We are denied this opportunity. We are hemmed and hedged in until the distance we are capable of seeing is very short indeed. This is why I am a strong advocate of parks, of promenades. Green is naturally a restful color, and if the city could be provided with long avenues and splendid parks, where one's eyes could stretch out in a long vista, it would be a great thing."—If this is true, and we have no doubt it is, the advice applies with especial force to the dental profession.—Ed.

Short Weight Causes Arrest.—Last month an individual in Louisville was arrested on complaint of a dentist, who alleged that the man came to his office, represented himself as the agent of a firm which buys old gold, and purchased some gold scrap. The dentist stated that the man weighed the gold on scales which did not give correct weight. At police headquarters it was learned that the sharper had been working the scheme in that vicinity for some weeks. As we have had occasion to remark before, gold scrap should be sent to a reliable firm of refiners or to a dental supply house and should never be given to "carpet baggers."

Southern Dental Society of New Jersey held its fifth annual meeting and banquet at Camden, Jan. 20, 1904, and elected the following officers: President, Alphonso Irwin, Camden; Vice-president, W. A. Jaquette, Salem; Recording Secretary, S. Ironside, Camden; Corresponding Secretary, C. Ironside, Camden; Treasurer, Mary A. Morrison, Salem; Executive Committee, W. W. Crate, Camden; J. G. Halsey, Swedesboro, C. P. Tuttle, Camden; C. P. Tuttle, Jr., Philadelphia; E. E. Bower, Camden, O. E. Peck, Bridgeton; Membership Committee, Alphonso Irwin, W. A. Jaquette, W. H. Gelston, East Camden; Librarian, J. G. Halsey.

Treatment of Facial Deformity Due to Upper Prognathism.—In the case of an excessive overbite due to abnormal development of the maxilla or want of development of the mandible, as the case may be, the upper teeth, being the more frequently lost or attacked by caries, more often call for attention. The teeth can with advantage be all extracted in the upper jaw, to encourage the absorption of the maxilla, and special attention may be paid to the lower teeth and roots to preserve them and prevent absorption of the mandible, which commonly in these cases is more or less undeveloped.—Geo. S. Bonalie, *Dental Record.*

Intelligence Located in the Left Frontal Lobe.—Dr. Charles Phelps (*Am. Jour. of the Med. Sciences*) summarizes forty-six cases of brain injury, of which he reports eighteen in detail, invariably showing impairment of intelligence when the left frontal lobe was injured or affected by disease, while in those in which the right frontal lobe alone was involved intelligence remained unaffected except upon the supervention of coma or secondary inflammatory conditions. The location of the injury, tumor, etc., was generally though not always in the left prefrontal lobe. These cases are quite conclusive as far as they go, and very significant.

Plaster Impressions.—The Latzer and Weise method will be found to

facilitate the taking of plaster impressions in difficult cases. Coat the tray with vaselin and cover with a layer of thin but strong gauze, previously soaked in water, allowing the gauze to project beyond the margin and over the sides of the tray. Let the plaster first poured be very thin so that the gauze may rise slightly; when the tray is filled the gauze will be enmeshed in the plaster. Remove when thoroughly hardened. Though fractured not a piece will be lost, all the sections being held together by the gauze, and an accurate reassembling of the pieces is readily secured.—*Cosmos.*

ILLEGAL PRACTITIONERS.—Jan. 15 a man in Brooklyn was arrested for practicing dentistry without a license.—Jan. 13 an individual in Rochester, N. Y., was arrested for failure to have a license to practice dentistry.—Dec. 22 the proprietor of a dental parlor at Newport, R. I., was arrested for practicing dentistry without a license. His employes could not be found, and the proprietor was let off on condition that he leave the city at once, which he did.—Jan. 13 a dentist at Seattle, Wash., who was recently arrested for practicing dentistry without a license, was acquitted of the charge on a technicality.—Jan. 4 three dentists in Tacoma, Wash., were arrested for violating the state dental law.

EASILY TOLD.—"The structure of the tooth," said the popular lecturer on dentistry, "is arranged in sections. The outer wall has feeling, but is not so highly sensitive that it will convey the sensation of pain. It is not until we attack the interior layer that we reach the truly sensitive portion of the tooth, and then it is sometimes difficult to tell when our instruments have touched a nerve or one of its filaments. There is, however, one infallible rule."

"And what is that, doctor?" asked a close listener. "How can you tell when you are inflicting pain?"

"The patient jumps."—*Judge.*

X-RAY IN DETERMINING THE LIMITS OF THE FRONTAL SINUS.—Dr. John Howard Philip of San Francisco recommends (*Jour. Amer. Med. Assoc.*) this method of determining the character of the diseased sinus before operation, and illustrates his remarks with a reproduction from a radiograph taken for that purpose at the San Francisco Polyclinic. In view of the fact that there are no frontal sinuses in a great many individuals—in some series of autopsies as many as fourteen per cent being without—this preliminary investigation would, as suggested by Dr. Philip, prevent injury to cranial contents in such cases when about to be operated upon for supposed disease of the sinus.

DENTAL CARE DURING PREGNANCY.—R. C. Newton (*International*) states that certain dentists decline to fill or clean the teeth of pregnant women, thinking that this will bring on a miscarriage. While it is perfectly conceivable that dental work might bring on a miscarriage, I believe that it has rarely done so, and in the vast majority of cases it is far better to preserve the teeth of a pregnant woman by doing the necessary work for

her than to allow the caries to go on until after the confinement is over, and so not only subject the woman to the risk of losing the teeth altogether, but also add to the gastronomic discomfort and indigestion from which a pregnant woman generally suffers, by leaving decayed and probably painful teeth in her mouth.

ROBBERIES.—J. W. Adams, Los Angeles, Cal., Dec. 30, $30.—C. F. Rounseville, Chicago, Jan. 21, $100.—W. Wood, New Orleans, Dec. 26, $200.—Black & Deseau, Detroit, Jan. 19, $100.—W. G. Sharp, Morristown, N. J., Dec. 28, $300.—E. H. Campbell, Cincinnati, Dec. 15, $75.—G. L. Cornelius, Columbus, O., Dec. 31, $50.—E. H. Raffensperger, Marion, O., Dec. 27, small loss. The burglars were frightened away by the ringing of a bell in the office which connected with the front door.—Wm. Pasters, Marion, O., Dec. 26, $100.—A. S. Condit, Mt. Vernon, O., Jan. 7, $200. This is the third time his office has been robbed in the past six months.—C. F. Oglesby, Xenia, O., Jan. 19, $20.—J. F. Stevens, Lancaster, Pa., Jan. 12, $15.—J. R. Singleton, Ft. Worth, Tex., Jan. 5, $40.—Lawrence & Williams, Ft. Worth, Tex., Jan. 5, $60.

FIRES.—J. B. McGrath, Ansonia, Conn., Jan. 1, loss $1,000.—Wms. Donnally, Washington, D. C., Jan. 21, loss $1,200.—Henry C. Hopkins, Lithonia, Ga., Oct. 12, loss $2,000, partially insured.—J. H. Walker, Walcott, Ind., Jan. 2, loss $500.—W. W. Miller, Perry, Ia., Jan. 9, loss $300, fully insured.—A. C. Titcomb, Augusta, Me., Dec. 19, loss $100.—S. L. Millard, Boston, Dec. 28, loss $400, no insurance.—E. E. Lobbess, Frankfort, Mich., Dec. 26, loss $500.—Cushman & Shaw, Claremont, N. H., Jan. 8, loss $900, partially insured.—C. Fallon, Lambertville, N. J., Dec. 27, loss $600, fully insured.—R. T. Allen, Lumberton, N. C., Dec. 30, loss $1,500, insurance $750.—F. S. Cary, Zanesville, O., Dec. 23, loss $700.—J. H. Hope, Pittsburg, Jan. 4, loss $300.—D. W. Stanton, Westerly, R. I., Dec. 23, loss $550.—L. C. Shecut, Orangeburg, S. C., Dec. 31, loss $500, fully insured.—L. S. Wolfe, Orangeburg, S. C., Dec. 31, loss $500, fully insured.

EXTRACTING FOREIGN BODIES FROM THE EAR.—There is no more delicate and even difficult task, so states the *Med. Press*, than the extraction of a foreign body from the external auditory canal. Irrigation often fails to bring it away, and in certain cases adds to the difficulty by causing the object, a pea for instance, to swell and become more firmly impacted. The employment of instruments is very painful and requires considerable dexterity, besides supposing an armamentarium specially designed for the purpose, which few general practitioners possess. The recommendation is made of a piece of soft rubber tube, the length of a cigarette and of the proper size, to be introduced into the ear. The end of the tube is dipped in paraffin and pushed into the canal until it comes in contact with the foreign body, whereon the operator, applying his mouth to the free end, aspirates forcibly, at the same time throwing back his head. Except in cases of angular bodies of irregular contour this method is usually successful, the body coming away with the tube.

SYPHILIS TRANSMITTED BY DENTAL FORCEPS.—The following is a case in which syphilis was apparently transmitted by dental forceps. In September, 1897, a young lady called at my office with inflammation of the eyes. It was in the evening; I diagnosed iritis and prescribed atropin instillations, and requested her to call the next morning, which she did. I gave her a very careful examination then, and found an eruption on the skin, hair falling out, etc. The history she gave was as follows: While visiting in New York City she had two teeth in the lower jaw extracted by a dentist. This was followed in a few days by swelling, sore throat, and enlargement of the glands of the neck, especially on the side whence the teeth were extracted. There was no question in my mind but that it was a case of syphilis, and the disease commenced in the mouth from the forceps used in extracting the teeth. Treatment by mercury and iodid was successful.—S. S CARTWRIGHT, *Medical Record.*

LETTING BAD ENOUGH ALONE.—

Trouble come ter see me,
  En howl on ever' han';
De Airthquake shake my house
  En swaller all de lan'!

I holler: "Mister Airthquake,
  What work is dis you do?"
He say: "Next time I hongry,
  Please God, I'll swaller you!"

En den I don't say nuttin',
  Though trouble make me moan;
Kaze wisdom is in lettin'
  Of bad enough alone!

—*Atlanta Constitution.*

DAMAGE SUITS.—A dentist in Illinois was arrested Jan. 6 on complaint of a young woman patient who alleged that the dentist assaulted her while she was under the influence of gas given prior to extracting some teeth. The court completely exonerated the defendant, as he proved that her charge was entirely without foundation. We would again impress upon our readers the advisability of having a third party present when gas is administered to a woman.—Last month a Chicago dentist was sued for $1,000 damages by a woman patient who claimed that the work he did for her was unsatisfactory.—A man in Syracuse has sued the city for $2,000 damages, alleging that he tripped on a public sidewalk, and in falling knocked out several teeth and so injured his tongue that his power of speech is seriously impaired.—A firm of dentists at Providence, R. I., has been sued for $5,000 damages by a man who claims they removed a section of his jaw bone and permanently

disfigured him.—Jan. 20 a woman in Spokane obtained $200 damages from a dental parlor on the claim that her work had been improperly done. Her attorneys took $125 of the judgment for fees.

FITTING AND ARTICULATING SEAMLESS CROWNS.—R. E. Sparks, *Review.* Having obtained a wire measure of the root which has been prepared, select a blank shell about the size and length required, and stamp the cusp suitable for the case. If the shell selected is too tight (this can be ascertained by slipping the wire measure over the punch last used in making the shell) it may be enlarged by placing it on the punch and tapping the sides. Again adjust the wire measure to the root to obtain the exact shape, and contour the crown to suit the space, being careful to make the open end the exact shape of the root. Trim until the crown is nearly short enough and the edge of gold passes under the free margin of the gum around the root. Now turn attention to the articulation. If a cusp is too prominent press it in. If the gold is soft enough the patient may bite it to an articulation, or it may be placed upon a lead block and tapped with a small hammer. If at another point the crown does not reach the articulation, place it upon the block and with a small punch press the metal out. In this way a good articulation may be secured. See that the length is correct and that the shape and size of the neck correspond to the shape and size of the wire measure. If too large draw in with a pair of crimping pliers. Reinforce cusps by dropping in solder and holding over flame.

EMBOLISM OF THE CENTRAL ARTERY OF THE RETINA FROM PARAFFIN INJECTION FOR NASAL DEFORMITY.—L. M. Hurd and W. A. Holden (*Medical Record*) report that immediately following an injection of paraffin for the correction of saddle-nose the patient complained of blindness in the right eye. The melting point of the paraffin mixture was 110° F. Ocular examination showed the veins normal, but the main inferior branch of the central artery of the retina and its divisions were empty and collapsed. The main superior branch contained some blood, but when gentle pressure was made upon the eyeball the blood column here broke up and the blood flowed backward into the central artery. Cardiac stimulants, massage, etc., calculated to force the embolus on into a branch of the artery and thus afford partial vision, were unsuccessful. Other cases in literature are referred to in which embolism followed a similar operation. The writers conclude that the obvious lessons taught by these cases is that loss of vision and even of life may follow the injection of paraffin into a vein. This danger could be partly avoided by performing aspiration after the introduction of the needle, and if there were no evidence of penetration of a vein, injecting the paraffin through the needle without moving it. There would remain, however, the possibility that the needle had passed entirely through and beyond a vein, and then the paraffin under high pressure might pass backward and thus gain entrance to the vein.

ALCOHOL AS FOOD OR POISON.—Professor Kassowitz has published, in a recent issue of the *Archiv fur die gesammie Physiologie,* the results of

investigations and experiments carried out by him in his efforts to settle the much-vexed question as to whether alcohol is a nutritive substance or not. A certain number of dogs were given definite amounts of food and required to take a stated amount of exercise each day. The dogs were placed in a running machine and the distance run by each dog was recorded. During the first week the dog that was given food without alcohol ran 10.888 kilometres per hour, while its mate, sustained by the same kind of food, with an addition of alcohol, ran only 7.847 kilometres per hour, and showed a loss of weight at the end of the week, the first dog having gained in weight. During the following week the work was reduced on account of warm weather. The first dog ran 7.794 kilometers; the second dog, given alcohol, 6.901 kilometers. Several other experiments of like nature were carried out, and it was found that the results were uniformly against the alcohol-fed dog, both as to the amount of work accomplished and changes in weight. The author thinks that the idea of alcohol having a nutritive value comes from the supposition that a part of the food may be oxidized directly without first taking part in building up protoplasmic substance. He is of the opinion that no food material can be used in the body without first being converted into protoplasm. Since alcohol, as a stimulating and poisonous substance, destroys the highly complex and unstable protoplasmic molecule, it cannot at the same time be assimilated by it, consequently it cannot act as food and poison simultaneously. After a comparatively short period alcohol paralyzes the centre of innervation for the muscles, and therefore, by diminishing the amount of muscular action, the secretion of carbonic acid is lessened. This diminished secretion consequently means no saving of the tissues of the body, but it is a direct result of the poisonous action of alcohol. Kassowitz is convinced that under no condition can alcohol act in a nutritive manner.

Ignition of Ether Vapor in Presence of a Closed Electric Light.—By Dwight H. Murray, M. D., in *N. Y. & Phila. Med. Jour.* While engaged in a tedious and difficult operation at one of the hospitals in the city, my attention was taken from my work by a sudden flash of light and some quick movements on the part of the anesthetist, and I found that the ether vapor had ignited, scorching the hair and eyebrows of the patient, and had burned the skin on his forehead sufficiently to cause a marked redness. The anesthetist reported that, the patient being on the face, he was unable to see the pupil properly, and he had turned on the electric light in order that he might more readily note the reaction of the pupil. The blaze had resulted coincidently with the turning on of the light. There was no exposed fire or blaze in any part of the operating room, and the only conclusion that we could arrive at was that the vapor of ether had ignited from the spark in the electric light burner made when contact took place in the turning on of the light. I have never seen reported or heard of any such accident taking place during the administration of ether, but the fact that it did occur shows that it can and may occur again. This being the case, it is well for any surgeon

or anesthetist not to turn electric lights on or off near the vapor of ether, particularly when the room is small and there is a large amount of vapor of ether in the room, as one can easily see what serious damage might result. I would also state that it is not so easy to produce a blaze by the turning on of an electric light in the presence of ether when we try it for that purpose. Since this occurrence I have tried the experiment several times in different ways, with the same burner and others, and have been unable to produce a blaze with ether vapor; so that, while it is possible that this experience may be unique, and is certainly of rare occurrence, every surgeon and anesthetist should bear in mind the fact that it has occurred. Fortunately in this case the anesthetist was prompt in his actions, and no damage was done, but very serious consequences might easily have resulted if he had lost his head.

MARRIAGES.—C. A. Baird, a dentist of Canton, O., was married to Miss Julia E. March of Canton, Dec. 31.—Carl H. Barnes, a dentist of Fulton, Ky., was married to Miss E. Beatrice Cullom of Nashville, Dec. 31.—C. C. Bauer, a dentist of Painesville, O., was married to Miss Anna Hastings of Painesville, Dec. 29.—E. E. Blickenstaff, a dentist of Flora, Ind., was married to Miss Maud Snyder of Indianapolis, Dec. 25.—C. A. Brennan, a dentist of Sharon, Pa., was married to Miss Anna Grace of Sharon, Dec. 31.—Carl Christensen, a dentist of American Fork, Utah, was married to Miss Nellie Mercer of American Fork, Nov. 12.—E. F. Conner, a dentist of Dinuba, Cal., was married to Miss Ora Simpson of Reedley, Cal., Dec. 13.—H. E. Dempsey, a dentist of Vallejo, Cal., was married to Miss Eldana Wilson of Vallejo, Jan. 5.—B. O. Frazey, a dentist of Gladbrook, Ia., was married to Miss Pearl I. Boggie of Marshalltown, Ia., Dec. 31.—Joseph B. Grom, a dentist of Newark, N. J., was married to Miss Laura Wagner of Newark, Sept. 11.—A. L. Gregg, a dentist of Nevada, O., was married to Miss Estella Noblett of Nevada, Dec. 24.—Lester Godlove, a dentist of Wellman, Ia., was married to Miss Minnie Stotts of Riverside, Ia., Dec. 24.—E. A. Marsland, a dentist of Montpelier, Ind., was married to Miss Myra Hagerman of Lynedoch, Ont., Dec. 31.—F. S. McKay, a dentist at Colorado Springs, Col., was married to Miss Gertrude Ellen Ronaldson of St. Louis, Dec. 31.—Chas. W. Seay, a dentist of Spencer, Ind., was married to Miss Fannie Wooden of Madison, Ind., Jan. 7.—L. E. Sevenman, a dentist of Kewsick, Cal., was married to Miss Anna M. Johnson of Waterford, Cal., Dec. 30.—Leslie Squier, a dentist of Spokane, Wash., was married to Miss Carrie E. Townes of Philadelphia, Dec. 12.—J. A. Steele, a dentist of Marengo, Ill., was married to Miss Helen Samter of Marengo, Jan. 1.—H. F. Stempel, Jr., a dentist of Ft. Madison, Ia., was married to Miss Augusta Dachroth of Nauvoo, Ill., Jan. 5.—C. B. Werts, a dentist of Ladoga, Ind., was married to Miss Mabel Brumbaugh of Ladoga, Dec. 31.—H. P. White, a dentist of Hawarden, Ia., was married to Miss Hattie Wing of Ireton, Ia., Dec. 31.—G. Williams, a dentist of Oakland, Cal., was married to Miss Julia Swafford of Oakland, Jan. 10.